JOURNAL
OF THE
Association *of* American Medical Colleges

Volume 15 NOVEMBER, 1940 Number 6

The Fundamental Sciences—Their Role in Medical Progress*

ANTON J. CARLSON
Professor of Physiology and Chairman of the Department, University of Chicago
Chicago, Illinois

To give the first Elias Potter Lyon Lecture, on this significant occasion, is to me both a personal privilege and a great honor. Thirty-five years ago I became acquainted with Dean Lyon at the University of Chicago and at Woods Hole. Almost every year since then I met Dr. Lyon in state or national gatherings of physicians, educators and investigators in the medical field. He was a pupil of that stimulating rebel in biology, Dr. Jaques Loeb. After several years of apprenticeships at Rush Medical College and at the University of Chicago, Dr. Lyon became professor of physiology and later Dean of the Medical School at the St. Louis University. Twenty-six years ago, with years of experience and funds of accumulated wisdom, he cast his lot with the University of Minnesota, as professor of physiology and Dean of its Medical School. Dean Lyon has a large share in the significant growth in the quality of instruction in and in the quantity of good research coming from this Medical School during the past quarter of a century. But, in my judgment, the University of Minnesota entrusted Dean Lyon with an almost superhuman task; namely, the leadership of the then preadolescent medical school, and the leadership of the important department of physiology. These are all day jobs for two superior men. That Dr. Lyon carried these two responsibilities with the results now in evidence, speaks volumes for his industry, his wisdom, his gift of leadership and his sense of humor.

Dean Lyon had a sound conception of the best means in and the true goal of medical education in a democracy. Medical students had in Dr. Lyon an inspiring teacher, his colleagues a fair, sympathetic and understanding administrator.

I am speaking to the memory of Dean Lyon, and that memory will not permit me the slightest deviation from the truth. Elias Potter Lyon may not rank with the giants of the earth, especially in medical research, but his conspicuous unselfishness, his industry, his sense of justice, his never failing kindness, and his salty but kindly humor are worthy qualities, challenging us all during the future years. He was "deaning" for over a quarter of a century, and at the end he was still a human being.

---

*First Elias Potter Lyon Lecture delivered as one of the features of the program marking the fiftieth anniversary of the founding of the Medical School, October, 1939.
Reprinted from the Minnesota Alumni Weekly, January, 27, 1940.

To talk to my medical colleagues in this state, or even to the medical students on this campus on the importance of the fundamental sciences in medical progress would be not only presumptuous on my part, but about as fruitful as "carrying coal to Newcastle." My real audience tonight are laymen, such as Governor Stassen, President Ford, and all the people of this state through whose generosity, understanding and labor the Medical School on this campus has attained its present capacity for service to man.

The mysteries of the starry heavens and the urgencies of human pain seem to have made man pause and ponder at the very dawn of reason. At any rate, the earliest accounts we have of man trying to understand himself and the universe deal with astronomy and with human sickness. The earliest, sporadic achievements in medicine here and there among the peoples of the earth, such as the use of quinine against malaria by the South American Indians, the use of toad skin for dropsy, and vaccination against smallpox by the Chinese several hundred years before Jenner, were steps in the control of, rather than in the understanding of disease. The Greeks had Galen, and Galen was on the right road, but he had few real followers for a thousand years. Hence, medicine in the sense of discovering the causes and working out the means of controlling and preventing human ills dates back only a few hundred years. And the ascending curve of achievements in medicine closely parallels the progress in the fundamental sciences of biology, chemistry and physics. This is not an accidental parallel, as we shall see. Nor is the parallel explained entirely by the fact that all science is one in method, and the human brain is the catalyzer of them all. The reason is: biology, chemistry and physics have furnished and will continue to provide many of the data, the hypotheses, and the tools necessary for the next step in the unending fight against disease.

Which are the "fundamental sciences," and what are their roles in medical education and medical practice? Human anatomy, animal physiology, biochemistry, bacteriology and pharmacology are historically the legitimate offsprings of medicine, and these sciences still dwell largely on the old paternal homestead. Perhaps it would be more correct to call biochemistry an adopted child—adopted from chemistry. They are now an integral part of modern medical education, medical practice, medical research, hence included in the term medicine. But human or animal physiology, at least, is as important in our secondary and college education, as it is in medical education.

We are slowly realizing that at all stages of education the traditional "three R's" must be rounded out with an "H", which stands for, not hallelujah, but *Health*. And health education is more than the establishment of so-called health habits, like love for the tooth brush, fear and hatred for gin and whiskey. Education is more than habit formation, more than cerebral canalization to the centers for love and hate. Education means understanding. Health education means understanding the living body, the living machinery of man, the known causes of disease or ill health, and the known ways of keeping fit. This is the contribution of the medical sciences to primary and general education in our democracy, as yet only partially either sensed or achieved.

The imparting of the traditional three R's to youth is by the nature of the case largely a matter of dogma and drill. But drill and dogma are largely futile in health education. Health education cannot be achieved by the memory route, as can the alphabet, the multiplication table, or the church catechism. Health education involves the A, B, C's of science and the scientific method, both on the part of the teacher and the pupil, that is, controlled experimentation, rechecked observation, repeatedly verified cause and effect relations. It is the development of the skill in finding "facts," the use of reason based on facts rather than an exercise of faith based on unverified dogma.

BOTANY.—What about the other biological sciences, botany, zoology, and the union of these two, with a sprinkling of geology and climatology, and constantly implemented by chemistry, namely agriculture? Do these play any role in modern medicine? Those who look no deeper than to the surface of things may say that the potato and the pine are so different from man, the self-styled "crown of creation," that the scientists who deal with the former cannot possibly produce anything of importance to human medicine. Let us pause and see. In the first place, the plant groups: bacteria and fungi are common agents of debilitating and deadly human disease. But more fundamental still: The essential machinery of reproduction, growth, nutrition, respiration, heredity and death is the same in the plant and in man. The plant is subject to disease and death, much as man, from defective heredity, malnutrition, poisons, bacteria, animal parasites and viruses. Plants take up from the soil and concentrate in their seed and other structures substances toxic to man, such as selenium and fluorine. Man secures much of his food from the plant kingdom, and the quality of that food (for example, vitamins, iodine, iron, the nature of the proteins, etc.) is of great significance to human health. Many significant medicines like quinine, ephedrine, digitalis, are manufactured by the plants. But, perhaps, it is in the studies in cell life, on the machinery of heredity, and on the mechanisms of immunity to disease in plants that the science of botany attains its greatest significance to human medicine. So the botanist is more than a "fellow traveler" to the physician, he is a fellow worker, that is, if the botanist will have it so.

We who labor in the field of human and animal health and disease have for fifty years been greatly puzzled by the seemingly abrupt and adult appearance of the complicated hormone machinery, specifically beginning with the vertebrates. The riddle has been solved for us in the last ten years, at least in part, by the plant physiologists. Many of these hormones are present and working in the tissues of the plant. In the vertebrates their production has become confined to specific organs or glands. It is no longer so perplexing to find that the pussy willow produces chemical messengers not so different from those produced by the ovaries of women, and the testes of men.

ZOOLOGY.—It is true, man can get tuberculosis and undulant fever from the cow and the goat, trichinosis from the hog, deadly glanders from the horse, Asiatic plague from the gopher and the rat, tularemia from the lowly rabbit, tapeworm from the fish, spotted fever from the wood tick, malaria and yellow fever from the mosquito, typhus from the louse, and deadly fever from the

parrot and this is just the beginning, not the end of the list. But these are not the things that make zoology so important to medical advance. The significance of zoology to medicine can be sensed, even by intelligent laymen, in the following facts:

1. The fundamental identity of body structure and body machinery in man and animals.

2. The essential identity of the machinery of heredity in man and in animals, and the importance of heredity in the susceptibility to disease, in the stability of the mind, in growth and longevity, etc., of man.

3. The frequent appearance of spontaneous diseases in animals, such as infections, cancer, dietary deficiencies, liver, heart and arterial diseases, brain and body failings in the ageing process, etc.

4. Experimental diseases, such as infections, the numerous and important dietary deficiency diseases, diseases due to deficiency or excess of the hormones in body can be induced in the animals, domestic and wild.

5. It is safer and faster to standardize new and old drugs on animals rather than on man.

The significance of these five zoological categories to progress in medicine are almost self-evident even to laymen with a speaking acquaintance with history and with the scientific method. Man is an animal. Some people believe, others hope, he is also something more. At times, man behaves as if he were something less. There may still be some uncertainty both as to facts and factors in biologic evolution, but the essential identity, in health and in disease, of the brain, the heart, the gut, the lungs, the liver and the kidneys of man and the animals is as certain as the product of two times two.

Unfortunately, we do not transmit our own understanding and knowledge with our germ plasm. We can give our children only the capacity and the facilities to learn. No matter how great our medical knowledge today, our children of tomorrow start exactly at zero. So each generation of medical students must secure its fundamental training in the nature of health and the nature and control of disease on the animal, living and dead.

History tells us that whenever we succeed in reproducing a baffling human disease in the experimental animal we start to go places, and go fast. The fundamental experiment of the immortal Pasteur was on sheep, not on men. Some serious human ailments can, at present, not be diagnosed with certainty without resorting to tests on living animals. The mouse and the rat, the guinea pig, and the monkey are necessary material in the modern medical school, the modern hospital, the modern medical research institute. Here I pause to remark that all of these agencies of medical progress in these United States today find themselves hampered by inadequate animal quarters for medical teaching, medical research and medical service to man. Even the wisest medical statesman could not foresee the expanding needs of this type of medical aids for tomorrow. Every unit of the commonwealth: City, county, state and nation, must nurture, not hamper,

this important avenue of medical advance, the use of animals in medical education and medical research. Are the citizens of Minneapolis and of St. Paul aware of this duty toward the great medical school in their midst?

PSYCHOLOGY, so far as it has succeeded in cracking its confining carapace: traditional philosophy, is a biologic science, has rendered and will render great service to medicine in the direction of understanding man.

PALEONTOLOGY and ANTHROPOLOGY may shed light on the antiquity of disease. These same sciences may some day tell us how long ago our ancestors were something less than apes, and hence how long the road ahead till we, their children, shall have earned the name: *Homo sapiens.*

PREVENTIVE MEDICINE is the natural child of fundamental medical research and social statesmanship. If in many medical schools this child is anemic, this mainly is due to lack of medico-social statesmanship. As regards a really comprehensive and effective disease preventing program for all the people, some progress is being made with smallpox, typhoid fever, malaria, tuberculosis, syphilis, dietary deficiencies, etc. But by and large, the perplexities confronting the students of nationwide disease prevention today seem as discouraging as did the control and the cure of individual sickness to the doctor of a hundred years ago. Ignorance, irresponsibility, poverty, and greed are formidable obstacles to the health of the individual. Nationwide, these seem insurmountable, except to the few of us who may be killed but never conquered. But the physician alone cannot win this war, nor can it be won without him. This program involves the regulation of industry by the needs of health; above all, it involves a very high level of education and sense of social responsibility on the part of every citizen. It will not be achieved by law or force. If and when it comes, it will be by the action of free men, based on understanding. It involves adequate food production (hence AGRICULTURE) and distribution (hence COMMERCE), adequate housing, adequate work for all who can and will strive, and the sterilization of those who cannot and will not do their share of the world's labor.

CHEMISTRY.—At this point Dean Diehl and his colleagues responsible for the program of this semicentenary probably think I am slipping. Except for this evening, the rest of the offerings may suggest that chemistry and physics are the only sciences fundamental to medicine. With malice aforethought, I have followed the model of the pastor who divided his text in two parts: First, what is in the text; second, what is not in the text, and he discussed the second part first.

We have volumes on the role of chemistry in medicine, and I have a feeling of mental paralysis, not because of paucity but by the very abundance of material and illustrations. Man is a chemical and physical machine. Some like to think he is more than that. Maybe so. Some day, when we know more about chemistry and physics we may actually know. But that the same chemical substances and chemical energies operate in man and in the rest of the universe is now abundantly proven. We owe to chemistry many of the methods necessary in the isolation, analysis and comprehension of the processes of health, as well as disease, in the identification of chemicals that cause disease, in the manufacture and purification

of chemicals that aid both in the prevention and in the cure of disease. The microscope revealed the cell as the present unit of life, but it remained for chemistry to reveal its composition and its energetics. Just picture to yourself where the physician and his patient would be today, without our present knowledge of the chemistry of respiration, of foods and digestion, of blood and urine, of growth, of hormones, of bacterial toxins and immune bodies, of such important remedies as insulin, arsphenamine, sulphanilamid, and vitamines? Several hundred years ago the brilliant but erratic Paracelsus said: "The true use of chemistry is not to make gold but to make medicines." Today we would say: the true use of chemistry is not to make gold, not even to make medicines, but to aid man in the understanding of his own life, and the universe about him.

PHYSICS.—Today the line separating chemistry from physics is very faint, indeed. These two sciences unite in probing the atom, in harnessing the electron. All life processes in health and in disease involve or consist in chemical change, and every chemical change has physical concomitants. The human eye, the human ear are in fact physical machines, worked by the physical forces of light and sound. The discovery of electrical energy did more for biology and medicine, than it did for industry. For millions of years there has been going on in all living things an adjustment to such physical factors in the environment as barometric pressure, oxygen concentration, humidity, heat, light. And there is no good reason to think that this is the end of the list.

Where would medicine be today, without the microscope? The X-ray, the form of physical energy, discovered just a minute ago, considering man's terrestrial time, is very nearly an essential in the diagnosis of gastric ulcer, tuberculosis of lung and bone, tumors, rickets, brain abnormalities, diseases of the gallbladder, the kidneys, the heart and the bloodvessels. Physiotherapy is in its infancy. In our present scanty understanding of cancer, X-ray and radium are helpful aids in its control. The ingenious contrivances given us by the physicists who perfected the radio have yielded a new method for studying disorders of the brain.

We need say no more. If these examples do not convince you that advances in chemistry and in physics constitute the very air, water, and food requisite for advance in medicine, I might as well save my breath and your time. A few years ago an able physicist told me that in his opinion, all physicists should abandon their research in pure physics, and for the next generation focus their brains and skill on biology and medicine. In my humble opinion, that would be a great mistake. Let a Compton and a Millikan continue to capture and dissect the elusive cosmic ray, from the top of the stratosphere to the bottom of the ocean. In the long run, that will be of greater service to medicine, than if such men, almost innocent of biology, should turn their attention to cancer. We need more, not less, brains in every science.

But the chemist and the physicist have an easier task than the physician. In their dealings with atoms and energy they are the least hampered by the human equations of ignorance, superstitions and misunderstandings of his fellow man. Not so the doctor. When he tries to protect children against smallpox, or tries

to get an understanding of the maiming and killing disease, high blood pressure, by experiments on dogs, peculiar people, like the anti-vaccinationists and the anti-vivisectionists say "nay, nay," with all their voices, all their votes, and all their wealth. And yet, the doctor must carry on.

So we see that medicine, specifically the science of medicine, is a hungry, omnivorous, but, I hope, humble and grateful bantling. He leans heavily on all science, but specifically on biology, chemistry and physics. Like the ameba and the sponge, medicine absorbs nutrients from the boundless sea of sciences, and doing its utmost to organize this growing mass of facts and skills to the understanding and the service of man.

If this brief survey of the role of the fundamental sciences in medicine is even approximately correct, several consequences seem to follow, consequences so pregnant in their portends as to make us all pause and ponder:

1. Medical education and medical research are becoming increasingly complex, time consuming, and costly. But we can see no other way. There are no short cuts.

2. The conscientious practice of modern medicine is becoming so complicated, and costly as to almost exceed the intellectual capacity of the ablest men. Again, I see no cure for this. Who shall bear the necessarily increased cost of modern medical service, the individual or society? I do not know the wisest way.

3. No university will be able to maintain a medical school of distinction, without great men also in biology, chemistry and physics. And pygmies in the humanities and the social sciences aid medicine not at all.

I would put first things first in this field, and that is: *able men*. In the past third of a century, I have listened to endless discussions on the minutiae of the medical curriculum. I have seen drives for bigger and better teaching and research hospitals, bigger and better teaching and research laboratories. I have listened to plans for "coordination of research" from people who do not have their milk teeth, not to speak of their wisdom teeth, of research. Talk comes easy. But real medical research and conscientious medical practice take everything that the ablest of us can deliver. It is not a union schedule of forty hours a week, but a sweating proposition of eighteen hours a day. And some universities, some university medical schools are still in the "stone age," aided and abetted by both public and private funds. Look at the piles of brick and mortar, steel and stone towering toward the sky on almost every state and city university and college campus the last ten years, largely through federal funds. In the meantime, how many new farthings have been invested in men in these institutions, in first rate men? Look at the record, and weep! To my knowledge, big buildings and small men have never made great institutions. But big men have frequently added mightily to our understanding of life in health and in disease, in primitive surroundings and with meager equipment. For years and years, it was my great privilege to walk and talk with Michelson, Millikan, and Compton, Neff and Stieglitz, Chamberlin, Moulton, and Moore, Whitman and Lillie, Loeb and Coulter, Billings and Hektoen, David Starr Jordan and William

Rainey Harper. Only two of these challenging spirits were medical men. If I have in any way contributed to medical education and medical research, this is due largely to the example and the challenge of these men.

The University of Minnesota Medical School, though fifty, is still in its infancy. Fifty years ago the echoes of the Brown man's war whoops had scarcely died on your prairies, and the bleached buffalo chips still littered the plains. The sod hut of the first settler, and the song of the ax in your primeval pine forest to the north were harbingers of a new era in man's conquest of nature in these parts. It takes labor and sweat, patience and wisdom to conjure forth the fruits of the soil, and the iron from the bowels of the earth. In these qualities the Minnesota pioneers, and their children have demonstrated their worth.

But it takes infinitely more labor, more wisdom, more patience, and more cash to establish and maintain that social and intellectual soil and climate necessary for the development of the finest qualities of man. Science, medicine, today and tomorrow, are a part, but only a part of that soil and climate. The farmer, the man in the mart, the teacher, the statesman can also significantly accelerate these processes, but only if the seed sprouts in the understanding of the common man.

Tonight, your Medical School rejoices that a man, Dean Lyon, passed this way. When every farmer leaves his acres a little better than he found them; when every worker leaves the imprint of human honesty and human dignity on every task performed, however humble; when every lawmaker helps to render human relations a little more equitable; when every judge leaves his court a tradition of a little more justice; when every doctor, every teacher, every investigator work more for love and less for hire; when every statesman leaves the path of compromise, conciliation and approximate justice a little more accessible and secure, we shall have something greater than fat cattle, marble palaces, tall buildings, radios defiling the pure ether with black lies, and might airships spewing pain and death on women and children. Even then, we shall not have perpetual health, not even perpetual youth. But we shall be well on the road to earn the designation: wise men. We shall still struggle for life and light, but shall have left behind the follies, the fears, and the fights of the jungle.

The Physiology of Anatomy

DONAL SHEEHAN
Professor of Anatomy, New York University College of Medicine
New York City

INTRODUCTION

THE PLACE OF ANATOMY IN THE MEDICAL CURRICULUM

The aim of every medical school is the training of men and women in the problems presented by disease and to fit them eventually for the practice of medicine. Specialization, it is generally felt, should not begin too early, and in the great majority of schools it is restricted to the postgraduate years. The undergraduate medical course, while serving as an introduction to all branches of medicine, is not, however, intended as an adequate preparation for immediate practice in any field. For this, subsequent hospital work is essential. The present medical curriculum has probably evolved with three main objects in mind: first, to give to the student a scientific foundation in the physiological and pathological processes of health and disease; second, to teach him the methods of examination in the search for clinical data and to train him to weigh and synthesize such evidence logically and critically in reaching a diagnosis, and third, to introduce to him, in a general way, the varied types of ailments which he may be called on to treat, either therapeutically or from the standpoint of preventive medicine.

Briefly, then, a medical course serves to give a foundation in general principles, a method of examination and diagnosis, and an introduction to clinical work in various fields. Of these three interdependent aims, the pivotal point is, surely, the training in examination and diagnosis. Be this as it may, the attainment of such aims demands the full use of the available time in the present medical course, and no subject can occupy too much of the student's attention without jeopardizing, to some extent, the balance of the final picture. Anatomy cannot be an exception to this rule. Such a clinical viewpoint in anatomical teaching does not necessarily imply an emphasis on surgical anatomy, for in the short time available for the study of the basic preclinical sciences details of importance only in the technique of surgery have to be omitted in order to allow time for the fuller comprehension of general principles. This is, indeed, fitting in view of the fact that the great majority of students will not become surgeons, and that those wishing to specialize in this particular field must in any case return to the dissecting room after graduation to relearn the anatomy of their own specialty. Indeed, the necessary burden placed on the student's mind in acquiring detailed facts of no immediate application is an ill way of training men to think.

What, then, is the function of anatomy in the medical curriculum? The general facts of anatomy form the basis of all accurate diagnosis. Diagnosis of disease begins with a careful anatomical localization and proceeds then to an investigation of etiology. The primary diagnosis, the anatomical localization, is dependent not only on a knowledge of the position of structures but also on their function. Anatomy must, then, be taught from the functional standpoint. It is,

indeed, the logical approach, for the student of medicine is interested first and foremost in function. The entire approach to the subject of anatomy and the selection of topics for emphasis must be guided by this principle. Let us, therefore, consider some of the practical consequences which arise from this attitude.

THE COORDINATION OF ANATOMY WITH PHYSIOLOGY

It is instructive to look back and find the close correlation which existed between anatomy and physiology in the early history of medicine. Indeed, it is difficult to discern often where the study of structure ended and that of function began. Galen and Harvey, fathers of the experimental method, taught in terms of anatomy, and even up to the beginning of the last century such leaders as Meckle the Younger, Bichat and Johannes Mueller were professors of anatomy and physiology. But it was in the physiology schools which are associated in our minds with the names of Claude Bernard, Foster and Langley, and Sherrington that the experimental approach and the synthesis of anatomical and physiological data were carried to their greatest height. Langley's brilliant analysis of the anatomy of the autonomic nervous system is an unparalleled example of the achievement made possible by the application of physiological methods to anatomical problems, and there is in medical literature perhaps no finer anatomical treatise than the account of the distribution of the spinal nerves given by Sherrington in the years 1892-1894 in which he laid the foundation for his subsequent work on reflex action in the spinal cord.

Anatomical thought, in the meantime, had become engrossed in the prevalent views of evolution and in the new science of embryology. In these fields great advances were made but in their very achievement anatomy lost some of its contact with physiology and became more purely morphological. The emphasis on the experimental approach and on function became eclipsed and this was inevitably reflected in the teaching. And with the advent of biochemical and physical methods, physiological thought also turned into other fields—into studies in metabolism, endocrinology and pharmacology where anatomical data were of less significance. With the notable exception of neurology, the separation of anatomical and physiological teaching became even wider.

It is in this field, where structure and function meet, that the future of anatomy lies. Indeed, it is a curious fact that by the very divergence of anatomy and physiology from this middle ground important topics have been largely neglected both in teaching and in research. Now it follows that if structure and function are once more to be taught as a whole, the present "block" system, in which anatomy is given in the first part and physiology in the second part of the first year, has to be discarded. From the point of view of the student it is basically unsound. Under such a system the student may dissect an organ, let us say the heart, in November, study the microscopical appearance of cardiac muscle two months later and yet not consider the circulation in physiology until sometime in April. It is no more logical than if a student of mechanics were shown a piston and a cylinder as separate parts but not told until six months later that the one moved inside the other for the purpose of compression.

In the New York University College of Medicine the course of anatomy has been extended throughout the three trimesters of the first year in order to run concurrently with physiology, and neuroanatomy and neurophysiology have been combined into one course in the first half of the second year. It is felt that with the same number of hours spread over a longer period of time the student is given a much better opportunity to absorb the important facts of anatomy slowly and to acquire the habit of correlating structure with function. Wherever possible, the schedule has been arranged to run parallel with the teaching in biochemistry and physiology. Furthermore, the gross and microscopical anatomy and embryology are so coordinated that the student is dealing with the gross, microscopical and embryological aspects of each organ at the same time as he is studying its function in the other departments.

Broadly speaking, the first trimester is occupied by lectures, microscopical laboratory and small tutorial conferences on the principles of the elementary tissues, from a combined structural and functional standpoint. During this time the same elementary tissues are being displayed in the dissecting room by the gross dissection of the limbs. Introductory lectures in the physiology department and classes in biochemistry run parallel with such a course in anatomy. During the second trimester the correlation between biochemistry, physiology and anatomy is considerably closer for the gross dissection of the thorax and abdomen is carried out while the circulatory and respiratory, gastro-intestinal and genito-urinary systems are taken up as topics in all three departments. During the last trimester of the first year, the head and neck are dissected in the gross anatomy laboratory and this is correlated with lectures and practical classes on the lymphatics, endocrine organs, and the cranial nerves in both the anatomy and physiology departments.

THE COORDINATION OF ANATOMY WITH PATHOLOGY

It has long been a puzzle to many medical educators that there is such a curious gap in the teaching of anatomy and its sister science of pathology. The recognition and study of pathological changes in tissues and organs demand a vivid image of the "normal," and under this term we must recognize the variations which occur in different physiological states, and the deviations relative to sex and age. This intermediate ground between histology and pathology is too often neglected because of the separation in time between the teaching of the two subjects. It would surely be more logical if the teaching of normal anatomy passed imperceptibly into that of morbid anatomy, and with the emphasis in the early part of the course placed on the reactions of living tissues to different physiological demands. There is no question that this can be carried out by a close cooperation between the departments of anatomy and pathology and by dovetailing of their schedules.

THE COORDINATION OF ANATOMY WITH CLINICAL MEDICINE

The importance of teaching the anatomical principles which have a clear application to the science of diagnosis has already been stressed. This does not mean that the anatomy course should be concerned with the teaching of clinical

data; rather the clinical application should be outlined briefly in order that the student may have a greater desire to learn the necessary anatomical detail. Indeed, it is a perfectly logical way of teaching any subject, to present the student with a rational basis for his study. Anatomy, in particular, with its strain on the memory, can become an extraordinarily "dry" subject if attention is not paid to this aspect. In many schools, a series of clinical demonstrations, with the presentation of selected cases to illustrate anatomical and physiological principles of significance in clinical medicine and surgery, is given during the latter half of the first year.

It may be questioned by some physicians how much of the anatomy taught is of real value in future diagnosis. This is very easy to answer for anatomical localization underlies every diagnosis. This can be seen most readily by examples. A cardiologist could not teach the clinical and pathological picture of congenital heart disease without a preliminary understanding of the embryology of the heart and the fetal circulation; the subject of coronary occlusion and its treatment by paravertebral nerve block would be curiously inadequate without a knowledge of the distribution of the coronary vessels and of their innervation, and the theory of referred pain in the chest and abdominal cavity is inexplicable without a background of the embryology of the coelomic cavity and of the viscera and a fairly accurate anatomical knowledge of the peripheral distribution of the spinal nerves. The localization of metastases in malignancy, the examination and postural treatment of joint disease and dislocation, and the science of reeducation of muscular movement are based on a fundamental knowledge of anatomy. The entire subject of peripheral nerve lesions, which are so perplexing to the average practitioner, and much of neurological diagnosis are essentially anatomical problems.

It is possible to multiply these examples in almost every field of clinical medicine but for the most part they are self evident. It is, indeed, because the anatomical background is so fundamental and so part and parcel of every process of thought in diagnosis that we are apt to forget its very existence. My experience has been that personal dissection of the entire cadaver, supplemented, but not replaced, by demonstrations, is the soundest and surest method of acquiring this essential knowledge.

In our school an attempt has been made to coordinate the teaching of anatomy with the clinical subjects in several ways. In the first place, the amount of detail required has been rigorously cut down and more emphasis has been laid on certain special topics. Thus, surface and radiological anatomy have been given special prominence, for after the first year's dissection is completed and during all subsequent clinical work the student will be visualizing anatomy through the skin and by means of radiological examination. It is essential, therefore, to start as early as possible to visualize anatomy in this way. Satisfactory dissection of the lymphatic glands and vessels is impossible in the cadaver. Nevertheless, on account of their importance in the spread of infection and carcinoma, the drainage area of each important group of lymphatic glands is outlined in lectures and demonstrations. The total motor and sensory distribution of each peripheral

nerve and spinal nerve root, considered as a whole, is emphasized rather than their detailed branching. Stress is laid on the movements at joints and on their limitations, on the weak points in a capsule and on important structures in close apposition to the capsule, which might, therefore, easily be damaged during a dislocation. The origins and insertions of muscles must be examined at the time of dissection because the action of any muscle can be worked out logically if its general points of attachments are known but the fine details of each muscular attachment have been omitted, and the muscles are considered in functional groups rather than as separate units.

This method of approach will be shared by a great many teachers in anatomy. It is, however, in the selection of material for omission that opinion will differ and often greatly. In this department we have tended to neglect the conventional descriptions of the separate bones, dividing off surfaces, margins, ridges, etc., the memorizing of muscular attachments in relation to a bone instead of to a joint, the smaller branching of arteries and particularly of veins, and the detailed relationships of each artery, nerve, vein, etc. We have felt it sufficient to outline the relative positions of the main structures in any particular region so that a three dimensional picture of the area as a whole is built up, rather than to burden the student's memory with tedious "lists" of relations "from before backwards" and "from within outwards," etc.

THE MODERN ANATOMY DEPARTMENT

The functional approach to anatomy, as outlined above, cannot be satisfactorily maintained without extending it into the field of research, for the level of original investigation in any department is inevitably reflected in its teaching. In many of the schools of anatomy of today particularly in this country the experimental method has once again been adopted, and the types of research work undertaken by anatomists indicate the modern trends in this subject. The architectural design of bone in its response to stress and strain, its vascularity in relation to osteogenesis and osteoporosis, the structure and function of the vascular bed of the skin, the functional components of peripheral nerves and of pathways in the central nervous system, the structural changes in the endocrine and other glands in different physiological stages, the isolation of their active principles and their effect on development and growth, the study of living cells and the whole field of experimental embryology—these amongst many others, are being investigated and taught in the anatomical schools of today.

The time has gone when an anatomy department consisted of a dissecting room and not always a histological laboratory. A modern anatomy department must be equipped for all types of experimental research. It must include an experimental unit with facilities for operative procedures, recovery experiments and kymographic and other recording apparatus. It must provide for tissue culture work and histological research of all kinds, and, in many instances, for experimental embryology. X-ray equipment may have to be included unless the radiological department is adjacent. In many instances, where endocrinology is the particular interest, facilities for chemical research must be available. Indeed,

the anatomy department of the future must be as well prepared for undertaking investigation in any field as the physiological laboratories are today. Le Gros Clark[1] has summed up this matter as follows: "The anatomist is primarily interested in the significance of structure and growth and their relation to function, the physiologist is, on the other hand, primarily interested in the physics and chemistry of the living organism and in the detailed analysis of the functional processes which have their basis in anatomical structure. To achieve results both must resort to the experimental method. It has been remarked that, in adopting this method, the anatomist generally aims at disturbing or modifying the normal functions in order to study the ensuing changes in the structural mechanisms which are involved, while the physiologist, in his researches, is concerned with studying function by interfering with or modifying the structural mechanisms which underly it. . . . Their studies are mutually complementary. Clearly it is undesirable and, indeed, impossible to confine either the anatomist or the physiologist within the strict limits of his science as arbitrarily defined by custom."

CONCLUSION

In putting forward these views I am not, I hope, overlooking the importance of anatomy among the biological sciences. I have felt, however, that this did not properly belong in a discussion of the particular relation of human anatomy to the medical course. For too many medical students anatomy has shared with Latin the distinction of being a language of the dead, and it has hindered rather than provoked that critical faculty and attitude of inquiry which it is the function of the preclinical subjects to impart.

This, then, is a plea for a more functional approach in the methods of teaching the subject of human anatomy and for a corresponding attitude among educators and examiners in medicine. It is a plea for greater coordination in the medical curriculum, between anatomy and physiology, between anatomy and pathology, and between anatomy and clinical medicine. And, perhaps, most of all, it is a plea for the recognition of experimental anatomy, and for the equipment of anatomical laboratories for the pursuance of new and productive fields of research.

1. Clark, Le G.: Brit. M. J. 2:418, 1936.

Planned Economies and the Medical Profession*

J. Howard Pew
Member Board of Trustees, Jefferson Medical College
Philadelphia, Pennsylvania

When a short time ago I was asked to serve on the Board of Trustees of Jefferson, I selfishly accepted because I knew that I could learn more from Jefferson than Jefferson could learn from me. I suspected that the other members of the Board, conscious of their own contributions, were anxious to find out what—if any—contribution I could produce, and so they demanded that I make this address. I am in the position of the old negro who announced that he had adopted a new philosophy which worked mighty well.

"And what is this new philosophy, Rastus?" he was asked.

"Well, Boss," was the reply, "I avoids de impossible but I sure cooperates wid de inevitable."

When I undertook this assignment I was far from certain whether I had anything to say that would be appropriate to the occasion, the audience and the scholastic atmosphere of this great institution. It happened, however, that I had been reading some of the all-too-plentiful propaganda that of late has gone out in favor of government planning and control looking to the socialization of medicine, industry and enterprise, and had found myself in acute disagreement with the economic planners; so I decided to come before you and present some reasons for my disagreement. In the debate over governmental economic planning I am a convinced supporter of the negative.

Our American system of free enterprise is far more than just a way of doing business. It is a system which, at its best, comprehends good sportsmanship, gives free play to the laws of supply and demand and of competition; produces an ever-rising standard of living, develops initiative, character and discipline, and in many ways goes far toward improving the morale and bettering the lives of our people. When I speak of free enterprise at its best I mean when it is entirely free; free from monopoly, private or governmental; free from government control or intimidation; free from trade agreements which would control prices and production after the manner of the European cartel system; and after the manner, too, of the late deceased NRA. For a democratic government to destroy free enterprise, is for that government to destroy itself.

Planning, as applied to the other fellow, has always been tolerated, and among those groups who do the planning for the other fellow, planning has been downright popular. There are many different kinds of planning—individual planning, group planning and governmental planning. In individual planning one can always protect himself with his fists, a club, or any other handy weapon. But in governmental planning one must combat the entire armed forces of the

*Address delivered at the meeting of the Alumni Association of Jefferson Medical College, held in Philadelphia, June 6, 1940.

nation. There is no surer way of ruining a man than for someone else to plan his life for him. There is no surer way of ruining a nation than for the government to plan for the lives and activities of its people; for a nation can be no greater than are its people.

The truth is that great inventions and new ideas for the advancement of the human race have always had to overcome popular prejudices and even organized opposition. Those who have possessed real inventive genius have invariably been regarded as "queer" chaps, to be viewed with suspicion and watched carefully. History teaches us that only through the operation of an economy of free enterprise has it been possible to effectuate the release of man's genius.

My quarrel with these economic planners is based on my belief that they know so many things that simply are not true. They do their thinking in a complete vacuum and entirely disregard that vast body of experience which proves that they are wrong. Experience and experiment are about the only things on which we can rely confidently. Detailed investigation and scientific experimentation are modern processes that the ancient thinkers would have regarded with scorn; but they have disproved much of what ancient wisdom accepted as fundamental truth. On this point one illustration has always appealed to me.

From the beginning of speculation about physics, it was believed that different weights would fall at speeds in proportion to their weight; a two pound weight would fall just twice as fast as a one pound weight. That was accepted as obvious and logical for centuries. Then, one day, Galileo climbed to the top of the leaning tower of Pisa with a two pound weight in one hand, a one pound weight in the other. He dropped them at the same instant and observed that they reached the ground also at the same instant. That was about the beginning of scientific experiment; a first step in the formulation of the laws of motion and of gravitation.

What we need nowadays are some Galileos of economics and sociology to drop a few weights in the right places; to examine and compare the experience of the ages with the panaceas that our economic and social planners are dishing out to us. In the light of that experience, it is difficult to give serious attention to those who solemnly argue that poverty is caused by overproduction; that an economy of scarcity will bring prosperity; that if we would only work fewer hours all of us would be better provided for. They urge us to hobble the scientists and to muzzle the inventors lest progress destroy jobs. Our twentieth century sophists kill off the little pigs in order to insure our supplies of pork. They heap paralyzing tax burdens on industry and enterprise, just when they want industry and enterprise to expand. And they decree that the farmer and all the rest of us shall produce less in order that we shall have more.

Such counsels would turn us backward just when we are ready to go forward at a pace never before dreamed of. Our utilizations of medical science, of electricity, of chemistry and the catalysts, are almost daily opening up new avenues leading to a better and more abundant life. But, we should not be too sure, in this troubled world, that we shall ever be permitted to enter this promised land.

Let us remember that there are some countries, once leaders in the march of progress, that today are burning up their books, suppressing free thought, regimenting education and deliberately chaining the race to the wheels of power politics.

In the face of all the experience of the ages, the economic planners would turn us into robots and have government do our thinking for us. We need only to go back a few decades to find repeated demonstrations of the truth that government, among all the agencies created by man, is least competent to direct our economic, our social and our spiritual life. History is filled with instances of how government would do our thinking for us. Let me cite an ancient one.

Rome, under Augustus, achieved its climax of prosperity. Augustus was no economic planner. Under his regime commerce and trade were given pretty free sway. But most of the later emperors went in strong for planning. The government tried to run practically everything. The senate gradually surrendered most of its powers to the emperor, though the process was not nearly so rapid as was the abdication of congressional authority in this country during the present administration. By the time of the Emperor Diocletian things had become altogether bad. The economic planners had, by favoring the cheaper agriculture of the provinces, well-nigh destroyed the agriculture of Italy. Finally, Diocletian took things firmly in hand and inaugurated a new deal. He decreed that one half of all the existing vineyards should be destroyed; that a subsidy should be paid for increased production of wheat; that the prices of all goods and services should be fixed rigidly; and that penalties should be imposed for all violations. Sounds a bit familiar, does it not? I suspect that if those old Romans had worn trousers instead of togas, a lot of tailors would have been thrown into jail for pressing them too cheaply.

In the end there was overproduction in some directions, and famine in others. The destruction of those vineyards caused such a scarcity of wine that it was decreed vineyards should be planted in England; which is about on a par with raising bananas in Iceland. Those decrees of Diocletian just about wrecked the empire. They were responsible for starting Rome on the road to its fall and ushering in that long period in history known as the Dark Ages.

Coming down to more modern times, and still illustrative of how government would do our thinking for us, is the story of the telephone. Within the lifetime of many people not yet old, the first telephone was installed on the White House desk of General Grant. After he had talked into his end of the wire and listened to the answering voice coming in from the other end until he was thoroughly satisfied that the thing really would work, he leaned back in his chair and said: "Yes, it is truly remarkable, but who in the world would ever want to use one of them?" Now, General Grant was quite a man. He won a great war and was twice President. And yet I submit that that incident justifies the gravest doubts about the vision of any economic planning board which he might have appointed; and as President, according to the theories of the present day planners, he would have had to appoint just such a board.

The story of the submarine illustrates governmental attitude toward invention. When Robert Fulton was living in Paris, he built a submarine and successfully navigated it on the River Seine. At that time Napoleon was projecting an invasion of England, to which, of course, British sea power appeared as the chief obstacle. Fulton tried to convince Napoleon that his submarine would assuredly neutralize British sea power. Napoleon was one of the greatest economic planners of all times, and his power and authority were absolute; but he could not see the submarine, badly as he needed it. Not until a century later was any maritime power willing to try out the submarine as an arm of its naval establishment.

In the summer and fall of 1787 the Constitutional Convention sat in Philadelphia. That same summer John Fitch, also in Philadelphia, built the first steamboat. It is generally accepted that the Constitutional Convention brought together the wisest body of men that ever undertook a big job. They laid the foundation for the world's greatest nation. So John Fitch, when his boat was ready, invited the delegates of that Convention to come down to the Delaware water front and see his boat start off. The Convention was adjourned for the purpose and many of its members accepted the invitation; but George Washington, President of the Convention, foremost among the nation's founders, and ardent advocate of developing our waterways, regarded the experiment as too illusive to justify the honor of his presence; so when the Convention adjourned he drove off to dine with a friend. The truth is that neither George Washington, Benjamin Franklin, nor any of those wise men in that Convention could possibly have imagined the consequences of that invention. And if not they, where could be found the economic planners capable of visioning them?

I would like to speculate with you for a moment, as to what might have been the attitude of a National Economic Planning Board back in the year 1900, if one had existed at that time, toward the automobile and oil industries of that day. There were then in operation in this country 8,000 automobiles, consuming 80,000 barrels of gasoline a year. That is just about enough gasoline to keep the cars of today in operation for one hour and a half. Let us imagine Mr. Ford, with his great vision of the automobile's future, appearing before that planning board and asking that in its program for the next two or three decades it provide a few billions of dollars of capital, along with the necessary labor and material, for his industry. The board would have recognized in Mr. Ford a mild lunatic. They would have asked where he expected to get the gasoline for all those cars, and would have pointed out that neither the gasoline nor the crude oil from which to make it was anywhere in sight and they would have rejected Mr. Ford's request. A sophisticated public would have laughed at Ford when the board set down genius as insanity and inventive ability as lunacy. And that would have ended all foolish talk about horseless carriages and flying machines.

But, fortunately, for those twenty-five millions of families in this country who today derive pleasure and satisfaction from the operation of their cars, there was no such board in the year 1900; and so Mr. Ford, not worrying about

where his gasoline was coming from, went right ahead building more cars and better cars, until presently he was turning out more than one million cars a year.

And, fortunately, too, for the oil industry, there was no such board; so that industry, too, went right ahead drilling more wells and deeper wells, and sometimes finding oil. They brought technology to their assistance in the form of geology and geophysics, and by their aid discovered new oil fields. And so the oil industry, doing each year things which would have been impossible the year before, was always able to keep just a step ahead of the thirst for gasoline of those multiplying millions of automobiles.

One more instance: When it was proposed, almost exactly one century ago, to build the first railroad into Philadelphia, the protests were so vehement as to verge on riot. If our economic planning authorities had weakly yielded to the proposal of the railroad, they would have been in grave danger of tar and feathers. But they would not have yielded. They would have known that railroads would scare the hens out of laying, the cows out of letting down their milk, the stage coaches from running, and in every way would have forwarded the most malevolent designs of the devil himself.

I must tell you what I consider the richest story of them all. I ran across this in a report put out by the Patent Office Society. About the middle of the last century, it was proposed in Washington to erect a new building to house the Patent Office. The Congressional Committee called in Mr. Ellsworth, who was then United States Commissioner of Patents, to ask his advice. Commissioner Ellsworth counseled against too large or expensive a building because invention had just about reached its limit. He related the astounding advances that had been made in the mechanical arts during his lifetime, and predicted a cessation of activity in the field of invention. There just was not much left to invent! That statement moved me to make a little investigation of my own, and I found that up until that time there had been taken out about 3,327 patents; and that since that time more than two millions of patents had been granted! Just a little increase of some 60,000 per cent. So much for that one government official who undoubtedly would have been a member of the National Economic Planning Board if one had existed at that time.

But Commissioner Ellsworth was not so illiberal as are most of our present-day economic theorists and governmental planners. He did not believe there could be many more inventions, but at any rate he did not propose to suppress them when they did come along.

If, speaking as a business man, my observations thus far have been directed primarily against restrictions and controls upon business, I am sure that you will realize that in no phase of human activity has progress been so dependent on intellectual freedom and individual initiative as in the profession of medicine. Let me cite just one such instance. One hundred and thirty years ago, Ephraim McDowell was a practicing physician at Danville, Kentucky, then a small hamlet out in the wilderness. A few days before Christmas he was summoned to travel sixty miles to see a patient, a Mrs. Crawford. The local doctor had told her that

she was pregnant, but after ten or eleven months had passed her condition became so alarming that Dr. McDowell was called in consultation. He diagnosed the case as ovarian tumor. No surgeon had ever dared operate in such a case, because it was popularly believed that any contact of the outside atmosphere with the interior of the abdominal cavity meant certain death.

But Dr. McDowell had long believed such an operation possible and induced Mrs. Crawford to let him do it. The operation had to be performed at his home, where he had his surgical appliances. So, Mrs. Crawford accompanied him on horseback the sixty miles back to Danville, suffering excruciating agony at every step. When the village learned that this unheard of operation was to be performed, feeling ran high against Dr. McDowell. The people believed the operation should be stopped, either by law or, if necessary, by a mob. But Dr. McDowell was undaunted. Even though he knew that the operation might result in the death of his patient, and certain death to him if the patient died, because he would be regarded as a murderer, nevertheless, he was prepared to take the risk.

The operation was performed on Christmas morning, and after the services at the local church were over the angry people gathered in front of the Doctor's house and, with a rope around a tree, were prepared to hang him just as soon as the patient died; and then, becoming impatient, they tried to break into the house, but were restrained by the sheriff.

This was before the development of anesthesia, and legend has it that Mrs. Crawford sang hymns to drown out the pain while the Doctor worked. Anyhow, despite the screaming of his patient on the inside and the howling of the mob on the outside, Dr. McDowell performed the first abdominal operation of its kind in the history of medicine. Mrs. Crawford not only survived the operation, but her recovery was complete, and she lived to be over eighty years of age.

If the socialization of medicine had been in force at that time, what do you suppose would have been the attitude of the Medical Planning Board toward such an operation? And, if throughout the world Medical Planning Boards had been in force during these last 130 years, what do you suppose would have been the status of medicine today? I suspect it would have been just what it was before Dr. McDowell performed this amazing operation. You may think such an observation on my part a bit rash. I only want to submit that there was little or no progress during all those centuries when the peoples of the world lived under various schemes of government control and economic planning.

I might go on indefinitely citing instances of the peculiar inability of government to provide leadership and inspiration for the genius of mankind, but time does not permit.

There is no limit to mankind's capacity to consume, nor to the resources from which demands may be met. Our only concern is to develop institutions which will permit the release of man's genius. We have made a good beginning; it is for us to preserve and protect all that we have thus far achieved, and to be sure that in the time to come yet more shall be added to it.

In conclusion, I appeal to you men of the medical profession to come to the defense of our American system of free enterprise and equal opportunity, for the truth is that no economic planning authority could possibly have foreseen, planned, plotted and organized such an amazing spectacle of scientific, medical and industrial progress as the world has witnessed right here in America during this last century. No trust or combination, private or governmental, could have accomplished it. It could have been achieved only under conditions where there was wide-open opportunity for all the genius, inventive ability, organizing capacity and managerial skill of a great people. Nobody must be barred, no invention rejected, no idea untried; everyone must have his chance.

To each of us is assigned a part to play in the great drama of life, and we can only play our parts with the greatest measure of perfection as free, unhampered individuals. Surely it is not thinkable that in the light which shows through this twentieth century, a great progressive people will be beguiled into turning back into the ways of controlled economies and dictated social programs.

You men of medicine and surgery have made many of the largest contributions to the welfare of humanity; you want to do your share of the world's work, but you have another and greater ambition. You want to create something which when it is handed down to posterity will make this world of ours just a little better and just a little finer place in which to live. You want to be filled with the vision of The Bridge Builder:

An old man who, traveling a lone highway,
Came at evening cold and gray
To a chasm deep and wide,
Through which there flowed a sullen tide.
The old man crossed in the twilight dim,
For the sullen stream held no fear for him.
He turned when he reached the other side
And built a bridge to span the tide.

"Old man!" cried a fellow pilgrim near,
"Why waste your time on your building here;
Your journey will end with the ending day,
And you never again will pass this way;
You have crossed the chasm deep and wide,
Why build a bridge at eventide?"

The builder raised his old gray head,
"Good friend, on the path I have come," he said,
"There followeth after me today
A youth whose feet will pass this way.
This stream which has meant naught to me,
To that fair-haired boy may a pitfall be;
He, too, must cross in the twilight dim;
Good friend, I am building this bridge for him."

The University*

JOEL H. HILDEBRAND
Professor of Chemistry and Dean of the College of Letters and Science
University of California
Berkeley, California

I have selected as my topic for this address, "The University." Such a choice surely needs no apology when the occasion is the birthday of the institution which is Alma Mater to the majority of those in the audience. This is, moreover, one instance when the subject under discussion, although referred to in the feminine gender, will not be in the least embarrassed by reference to her age. There are two good reasons for this: first, because of her youth, as universities go—a paltry seventy-two years; and, second, because, whatever are the hormones which are responsible for vitality in universities they are not diminished by time alone but by other factors fortunately more subject to control.

The subject may seem trite to some who may be tempted to believe that because they have spent some years in the University they know her pretty well. That, however, would be an unwarranted assumption. Any man who thinks that he is well acquainted with a lady because he has been associated with her for several years is evidently naive and inexperienced, for a university possesses, even more than did Cleopatra, a variety so infinite that but few persons can really know her.

If we should put the question "What is the University?" to a number of persons, what answers would we get? One can almost guarantee answers equivalent to the following. To the alumnus who has not succeeded any too well in ordering his own life, the university is the place where one spends the happiest four years of his life, a sort of playground, marred only by the interference of professors, whom one learns gradually to placate or ignore. To the salesman it is a place where one may make a host of such friends as might later buy bonds or insurance. Such a one was the student who consulted me regarding two fraternities, both of which had given him bids. His inquiry ignored the financial or academic standing of the two houses and went straight to the goal of the relative sizes of the national membership of the two organization. He evidently expected to sell a great deal. To others, it is an athletic club, whose chief business is to stage gladiatorial combats furnishing an emotional debauch to 80,000 spectators. To others, it is a livestock show, at which one can look over members of the other sex in order to make a good matrimonial match. Again, it is an interlude between school and the dire necessity of making a living—an interlude now greatly prolonged by the difficulties young people have in finding jobs. To those parents who feel like outsiders when they are among college graduates, it is a better start in life for their children.

*Address delivered at the Student Assembly of the University of California Medical Center, San Francisco, on Charter Day, March 28, 1940.

Again, it is an institution which gives degrees: the Bachelor's degree, to show that one has been to college; the Master's degree, to gain an increase in salary for the high school teacher; the Doctor's degree, to land a teaching position in a college. To some of the "haves," interested in maintaining the *status quo,* it is an institution which should indoctrinate young people with safe, conservative ideas, designed not to jar the social order. To a few at the other extreme, it is a collection of young people ripe for the sowing of the seeds of discontent in order that the way may be paved for uprooting present institutions and substituting an ideal society of their own design. For many the University offers preparation for making a living. Not only do we have the curricula leading to professional competence in engineering, medicine, dentistry, pharmacy, various branches of teaching, chemistry, social service, agriculture, animal husbandry, commerce, nursing, etc., but there are girls on the campus who are evidently planning to become news-girls, and find in selling *Pelicans* a pathway to some sort of future success. The sophomore boys in the fraternities become third assistant athletic managers, probably in order to prepare themselves for janitorial work later in life.

But parallel to all this vocational urge is another aspect of the University, which properly appeals to many. It is the enrichment not of the pocket book, but of the mind and spirit. Orators at high school commencement exercises, now and then, quote statistics concerning the earning capacity of several classes of people—those who have not been to high school, those who have had a high school education, and those who have had a university education—drawing the conclusion that the more education one has, the more money he can make. This conclusion, of course, overlooks the possibility that the university may merely have selected those of greater ability who would have made more money even though they had not attended the university. The most important feature of a university education to the individual is not that it may enable one to earn more money, but, instead, to need less. A person who has trained himself to intellectual companionship with the great of all ages does not need to pay for the social splurges that sometimes seem necessary in order to maintain ordinary social prestige. The one advantage of being a university professor is that one belongs to the greatest fraternity of all, the fraternity of scholarship. Wherever a scholar goes in the civilized world, he is welcomed by equals and entertained without vulgar ostentation. The poor business man, on the contrary, is forced to entertain his colleagues and competitors in a way designed to give the impression that he is one of the successful.

Historically, the great universities have been built on somewhat diverse foundations. Salerno, which may be regarded as the first university, with origins going back, probably, to the ninth century, was chiefly a school of medicine. Bologna attracted those interested primarily in the law and led to the foundation of the University near the beginning of the thirteenth century. Faculties of medicine, philosophy and theology were added later. The great University of Paris prized skill in dialectic above all else. Since theology in those days offered

more opportunity for dialectic than any other intellectual activity, it is easy to understand that the center of interest lay in theology and canon law, with medicine and arts added later. Colleges were established which were not professional groups, but rather groups of students living together, more on the English plan.

The origins of Oxford and, later, Cambridge, were apparently similar. The University of Prague was founded in the thirteenth century. Cracow, in Poland, interestingly enough, was famed as a center for astronomy. Heidelberg, one of the greatest of the continental universities, was founded in 1385.

The weight hung around the neck of all universities during the Middle Ages was scholasticism—an attitude toward learning which made it a sort of abstract game to be carried out according to elaborate rules and rather sterile of significant results. Prestige depended on authority and intellectual dexterity not easily challenged by objective tests. It is, of course, easy for a learned man to be an intellectual conservative. So long as knowledge is ancient and complicated, the learned man has an almost fatal advantage over the upstart. It is the exploration of new territory that gives advantage to the young and vigorous. It is especially noteworthy today, by way of illustration, that most of the great advances in physics have been made by relatively young men, not too much encumbered by outmoded ways of thinking. We modern university professors, by the way, are still subject to this temptation to which the medieval scholastics so readily succumbed.

The revival of learning at the close of the Middle Ages, and particularly the rise later of modern science, brought a great deal of fresh air into the universities. This became apparent not only in the natural sciences, but it spread also to the social sciences and to the humanities. The older endowed universities in the United States were at first hardly universities, but rather training schools for the learned professions—theology, law and medicine. Only those young men who intended to enter one of these professions thought of going to the universities at all. Johns Hopkins, taking its cue from the modern German universities, jarred them all into a new concept, that of contributing to the learning which they were designed to teach. The state universities, necessarily non-sectarian and intended to provide education for all those deserving it, widened the scope beyond the above three learned professions. This trend has continued right down to the present, accelerated by economic conditions in which young people find it difficult to find employment immediately on graduation from school, until now it appears to be the normal ambition of most high school graduates to attend some sort of a higher institution. This has, of course, resulted in a multiplication of objectives, between which there exists more or less confusion, as stated at the outset.

Let us, for the moment, put aside this kaleidoscopic picture of our universities and approach them somewhat more philosophically and deductively. Let us ascribe to the State a wisdom it actually possesses but dimly and unconsciously, and, in the spirit of Plato in his *Republic,* ask what fruits an enlightened state would expect of its universities. That there is a connection between the presence

of universities and a flourishing culture is evident to any student of the history of the world during recent centuries. The backward countries are those without great institutions of learning. There is also apparent an intimate connection between a satisfactory economic and social system on the one hand and freedom of the press and freedom of intellectual inquiry on the other. We are reasonably well convinced in this country that the maintenance of our institutions requires freedom of the press. It is not so clear, unfortunately, that the freedom of the press will not be maintained where there is denial of free intellectual activity. It is just as essential, however, to have freedom to comment on public affairs as it is to have freedom to report them. It is strange to find a certain portion of the press eager, in the name of patriotism, to attack academic freedom, not realizing that if their attacks on the universities in this regard were successful, they would react as a boomerang on their own freedom.

Our ideal state, further, would seek to recruit its learned professions. I doubt, however, whether the State would undertake the expense of supporting a university mainly in order that a small percentage of its citizens should be taught to hew their way in life and get the better of their less fortunate fellows. There are men who seem to think that society cannot survive unless they are allowed to become rich and furnish the alms, the employment and the taxes, but this can hardly be the view of the State. If a chemist or a surgeon is educated at a cost far in excess of his own tuition, it is scarcely for the purpose of enabling him to become rich.

It may even be questioned whether the more moderate and justifiable goal of assisting people to become self-supporting is in itself a right to be enjoyed only by the few, unless these few repay their debt by some sort of service to the many. The value of such service is hardly likely to be very directly proportional to the amount of money one can collect for it, particularly in cases where one is in a position to fix his own compensation. The late William Jennings Bryan seldom made statements with which I could agree, however, I did agree with one pronouncement in which he said that although it is possible for a man to earn a great deal of money, those who have truly done so have been so busy earning it that they have not had time to collect it, whereas those who have collected great wealth have been so busy collecting it that they had not had time to earn it.

This attitude toward money making is something for the medical student to think about before he has earned so much and got so used to a corresponding scale of living that he cannot face the question honestly. The medical practitioner is engaged not only in a profession, but also in private business. Although the vast majority do not become wealthy, some do. It is easy to salve one's own conscience in such matters, but it is not so easy to remove grounds for public criticism. It is all very well to point to the number of charity patients which a physician may have as counterbalancing excessive fees charged to others. The argument falls flat, however, in cases where the amount so collected is far in excess of the charity dispensed.

I am talking frankly, within the family, but hardly in ignorance, since the same problem is faced by the professor of a science having commercial value.

Although we having nothing to do with the fixing of our own salaries, and most of us let nature take its course without ever making any demands, we do face the problem of building up a consulting practice, capitalizing our knowledge and our positions within the university. It is easy to persuade one's self that all such outside work is done from altruistic motives, and that the fees therefore are slipped into one's hip pocket without any conscious effort. Such practice is alleged to make the professor much more efficient, acquainting him with the actual conditions of life. This may be true in certain instances, such as engineering, but I have found that the opportunities that have come to me to engage in consultation have almost never been of such a nature as to enhance my value to the University and to students. We prefer, therefore, to be completely professional and not partly commercial, endeavoring to serve the University rather than Mammon.

Now I, a layman so far as medicine is concerned, am not in a position to give too much advice regarding the ultimate relations between the medical profession and the public, but I would assert that if it is a profession and not a business, that relationship must be built on an altruistic foundation. The true scientist may take what compensation comes to him in all thankfulness, but his activities are determined not by this, but by devotion to the search for truth. He prefers the thrills of exploration to the flesh-pots of civilization. We may recognize this spirit now and then even in the careers of those who carry on rather humble occupations. It is a spirit which brings dignity and respect to those who have it. It ought to be apparent to the layman as residing within the medical profession and not require so much explanation and defense from medical men.

It seems to me that some of the advantages enjoyed by a university professor might be attained by medical men if they would face the issues more frankly. These would include getting a less costly start; more association with equals; opportunities for continued study and self improvement; freedom from bill collecting; increased public respect.

If our ideal state is not particularly interested in making a few of its citizens wealthy, what are its purposes in establishing universities? I should like to read to you an answer to this question drawn up by the Special Committee on Educational Policy in November, 1933. It is a statement of the functions of a university as distinguished from a secondary school, and sets forth those distinctions on which educated persons are in substantial agreement, but which are often not understood by the public at large. They are distinctions, however, which should be understood by members of a university and by its graduates. The statement is, in part, as follows:

"The essential aims of the University, are, on the one hand, to enlarge the intellectual resources of men; on the other, to demonstrate, for the instruction of students, how this is accomplished, and to provide opportunities for students to take part in this activity.

"The student of today becomes the 'man of affairs,' the 'ordinary citizen,' or the 'professional man' of tomorrow. On leaving the University the student

enters directly into a world subject to intellectual, social, economic and political changes and upheavals. The University lays stress on the pursuit of knowledge and 'the advancement of learning' for the specific reason that no fixed body of knowledge will be found adequate to meet the emergencies which constantly arise. New situations demand new intellectual responses, both on the part of investigators and on the part of the public. To maintain itself in the modern world, the body politic must have at its command all the resources of knowledge which are available; for this purpose, it must have an organization (the University) which is alert to the demands for new knowledge. The State of California, which has an infinite complexity of interests and needs, cannot assume that the knowledge required in any emergency is available in books. It must have, within its community, not merely 'practitioners' in medicine, engineering, agriculture and other fields, but professional men competent to deal with new situations and problems. The service of the University is not limited to the training of experts. It must also provide for the education of man, competent to analyze and weigh measures of public importance, and, in the interest of the public, to fit the recommendations of experts to existing conditions. Further, the University must provide the largest possible number of individuals capable of discussing and forming judgments on the many issues which, in our democracy, are submitted to the people for decision, and thus aid in the formation of an intelligent public opinion. The State is dependent on the University for men whose judgment is characterized by discrimination and balance, is free from servitude to temporary feelings and emotions, and takes account of immediate situations in the widest terms of their setting and significance.

"To render these services to the State, the University cannot restrict its teaching to the transmission, from generation to generation, of what has been thought and said in the past; it must provide, for all who seek instruction, an education which will fit men, in the present world, to assume responsibility and to form independent judgments on matters involving the future welfare of the commonwealth. The University is able to meet these obligations through devotion to the aim of giving every student the opportunity to discover how knowledge is attained."

It is the performance of these functions which marks the real university. Those others, previously mentioned, are either incidental, unnecessary, or even hostile to its true purposes. For example, friends can be made wherever people come together. Matrimony has never required the presence of libraries and professors. A job in a hardware store may give more acquaintance with business than a third assistant athletic managership of a team. Athletic clubs can organize teams whose members are free from the embarrassment of a little scholarship on the side. Indeed, it may be remarked that one way to distinguish real from spurious universities is by the intensity of their efforts to put forth winning teams. A true university can lose games with impunity; the spurious one cannot, for it would have left too little claim to distinction. Indeed, all of these things can be done as well or better through other agencies. It is the

scholarly and cultural function alone that depends uniquely on the university. No other institution exists which performs it to any considerable extent. The university is the one great agency for giving continuity to our intellectual heritage, transmitting the most important of all legacies from one generation to the next.

It is easy to think of this heritage as a stagnant reservoir, a pool of knowledge preserved in books and in the heads of professors, knowledge to be dipped out in prescribed doses. It is important to realize, however, that stagnant water acquires an unpleasant taste; one drinks it of necessity and only a minimum amount. It is quite otherwise when we quench our thirst from a rushing mountain stream.

Our students should, so far as possible, drink living water, not too far downstream from its sources. Not all of them will be hardy enough to climb up to the pure snow fields of the mountain peaks, but they can, at least, be served by those who have scaled the heights.

It is frequently assumed that teaching and research are antithetical. This can result only from a confusion of teaching with entertainment. It actually implies that in order to be a good teacher, one must have so little interest in the subject taught that one asks no questions not already answered in the book. Personal charm and a fund of stories constitute the chief equipment of such a teacher. It does not follow, one must admit, that a successful research worker will be skillful at exposition or arousing interest among those who may not naturally have much of it. One may, perhaps, be a great researcher and a poor teacher, but hardly a great teacher in the absence of research, provided, of course, that the subject itself presents an active field for exploration.

It is the privilege of the teacher, in almost every branch of natural sceince, to give his students the exciting impression of a subject still in the making, where the process itself is more interesting than the results. Whatever secret pride a professor may take in his own fund of knowledge, he should be humble enough to recognize that the frontier a decade hence will likely be far beyond its present location. The student, therefore, should be given a full sense of this onward march of the frontier. As the accumulation of factual knowledge increases, we are in grave danger of piling upon our students an ever-increasing load of facts to be memorized. We say, as every new discovery is made, "Good heavens! it will never do for our students not to know this. We must add it at once to the curriculum."

I realize that the physician is under a peculiar disadvantage, because his patients expect him to carry everything in his head. He is not free, as a chemist fortunately is, to look up the facts he may have forgotten. He must appear, at least, to know it all. While a physician may achieve a certain kind of success by making a good impression on his patients, regardless of what he may do toward curing their ailments, these ailments are, however, challenges to his scientific skill, even more than to his memory of facts. The approach to a problem—and surely a diagnosis is a scientific problem—often consists in

scratching the head and trying to recall a formula or a fact. A truly scientific approach, however, is something rather different, and has no valid substitute.

I wonder whether those who deal with the extremely complex problems encountered in such fields as engineering and medicine are not in danger of too little training in scientific methods, the methods whereby scientific problems are solved, as distinct from reference to the pharmacopoeia, handbooks, tables and formulas. It is hard enough not to take refuge in these substitutes, even in the more exact, pure sciences, such as chemistry and physics. It must be much harder to avoid this temptation in medicine and engineering. The trouble with the substitute, however, is that it enables one to deal only with the problems that have been encountered in the past and does not equip one to solve the problems of the future. As I recall my own undergraduate and graduate instruction, I feel that I could have been spared one-half of it, with no loss of present efficiency. I frequently wonder whether much that we now include in our systems of instruction will not prove to be rather useless in the future. It would be a fine thing to be able to discover and delete this portion now.

The aim of higher education too often appears to consist of competition with an encyclopedia as a repository of knowledge. This is, for most of us, a horribly discouraging ideal, for it means a race between memorizing and forgetting, complicated by the frequent discovery that some of the things we have been at such pains to remember are not true. It is far more encouraging to any one confident of possessing a pretty good brain to think of education as learning to use it with maximum effectiveness. Education, then, becomes analogous to training an athlete rather than fattening a hog. The athlete may take on weight, but in the form of muscle. His training develops endurance, muscular tone and coordination, which can be applied not only to the activity wherein it was developed, but, beyond this, into some new activity.

As the athlete must subordinate other desires to that of keeping fit, so the university must concentrate on its main task and resist too much dispersion of effort. Its main function is at best difficult to perform and is too readily obscured by subsidiary aims, however well intended. Universities have been harrassed by demands that they indoctrinate their students, that they turn out certain desired types: the gentleman, the religious devotee, the conservative, the patriot, the national socialist. If the order for tomorrow is the socially minded type, why not the rugged individual for the day after tomorrow? Who is qualified to tell a university that its duty is something other than devotion to truth and developing skill in its pursuit and application?

We may well be proud of the University of California, for it has seen more clearly than many universities its true functions and has pressed forward to a high place among the great universities of the world. The State, in establishing it, wisely provided, through long-term appointment of regents, for independence from partisan politics, and it has been free from political interference such as has troubled several other state universities. Moreover, its support is drawn from so many sources that it has not had to yield to the minority pressure groups,

such as the athletic alumni, who have, in many instances, embarrassed both state and private institutions.

Its academic government is of a form that is the envy of sister institutions and a source of unusually friendly relations between the president and the faculty. Decisions regarding purely academic matters rest with the Academic Senate, a sort of town meeting of the faculty that provides free discussion of controversial questions. Administrative authority rests finally with the President, but in matters vitally affecting the faculty, including departmental budgets, calls and promotions, the President receives recommendations from properly constituted committees of the faculty. These procedures have aided in building up a faculty of unusually high quality, have developed a sense of responsibility and devotion on the part of its members, and have prevented hostile criticisms of the President that have arisen in some universities where administrative authority is arbitrary. It would be hard to imagine more cordial relations existing between a president and his faculty than those existing here.

The University has been successful in maintaining admission requirements that have encouraged good high school preparation in the subjects which serve as a foundation for academic success. Although the student body includes many with but little intellectual thirst, many who are far more interested in the side shows than in the main tent, there is a large proportion of students possessing brains, industry, initiative and intellectual curiosity. They are the hope of the state for tomorrow.

I referred to this situation in a recent paper published in *School and Society*, wherein I said that "a few private institutions may succeed in excluding the inferior student, even though they have the problems presented by alumni who send in unworthy sons and promising athletes, and by benefactors whose good will is bread and butter for the faculty. Most institutions, however, have already assumed part of the burden of doing what is possible for the numerous young people whom society has nowadays proved incapable of employing in some better way. Our standards are already lower in practice than in theory. This need not spoil an institution, however. We can cope with the situation if we can see that the university becomes great, not by attempting to exclude all inferior souls, but by attracting and nourishing the superior ones. Indeed, if superior people can thrive only in the hothouse, where they are free from contact with the inferior, they will not be worth much in the world into which they will be dumped on graduation. The less gifted, too, have their claims and needs, which can be satisfied better if recognized frankly."

The University of California is still young in spirit as well as in years. It has not settled down into a complacent conservatism, but is engaged in continual re-examination of its methods and ideals. It has a wholesome experimental attitude. It is imperfect, it is true, because it is composed of imperfect individuals, but it realizes that fact, wherein lies its chief guarantee of improvement. And with all its imperfections, it is still one of the places in the entire world offering the richest opportunity to those who hunger and thirst. It deserves your respect and devotion.

Training and Cultural Background of the Physician

W. Dock

Professor of Pathology, Stanford University School of Medicine
San Francisco, California

Administrative officials of medical schools are beginning once more to emphasize the need for the humanities and the risk of overdoing the sciences in preparation for medical school. Reading their discussions, it seems probable that they have too high an estimate of the level of culture of the average medical graduate in the decades from 1890-1910, and a somewhat exaggerated idea of the scientific training of recent graduates or of the present students of medicine. This is due, probably, to their more intimate contact with men on the teaching staff than with the general run of graduates. One who has much contact with the average, and especially with the less successful older physicians, gains the impression that the lower third of our present classes not only are more highly trained medically and scientifically, but have more general information, more curiosity about mankind, than did their predecessors.

However, this does not mean that conditions are in any way satisfactory today. The best students are better prepared, the worst ones not so badly prepared, as they were twenty or thirty years ago, but the average still leaves something to be desired, and for this reason, men like Dean Rappleye and Dr. Zapffe are rightly concerned[1] with the premedical requirement as an important element in determining the quality and character of the medical student and the physician.

I think it may well be urged that the type of premedical education is far less important than are the medical school and hospital atmosphere in determining the interest of the student and young physician in science and the humanities. If he finds his teachers attentive to music, world affairs, literature, languages, general scientific progress, travel or social betterment, the student or intern will usually discover that he, too, is curious about such things, and will find time to begin or to continue parts of his education, which either will not germinate or will quickly atrophy, if he finds that fellow students, interns and teachers, especially the younger staff members, are merely medical robots, whose entire interest is in the most practical phases of diagnosis, therapy and operative procedures. No amount of premedical emphasis on language, culture or humane studies can fan the flame of interest to such a glow that a trade-school atmosphere for the next six years will not quench it in most minds. The only way to turn out scholarly and cultured physicians is to have students live in a scholarly and cultured atmosphere while in medical school and in the hospital; and if the atmosphere is good, even high school graduates will desire and absorb the fundamentals of culture and of science as well.

---

1. Rappleye, Willard C.: The College and Medical Education. J. Ass. A. M. Colls., 15:221 (July), 1940.
Zapffe, Fred C.: The Relation of General Education to Professional Education. J. Ass. A. M. Colls., ibid, 228.

The medical schools represent an enormous investment for the training of physicians, yet scarcely any equipment is needed to inculcate sound ethics, broad interests and deep understanding of one's fellow man. For these purposes, a widely sympathetic spirit, good associations and a library are quite adequate, and these should be developed by every medical student and medical school. The vast complexity and expense of the school are necessary to furnish training in natural science as applied to medicine, for without superior training in science, and without a firm grasp of its spirit, the physician's devotion, energy and understanding can scarcely be distinguished from the fawning zealous shrewdness of the charlatan. It is, therefore, necessary that the men and women who enter medical school have the capacity to study natural science, plus the other qualities which are needed for success in living with their fellow men.

It is regrettable that secondary education is so defective that the study of English should be required in college or that students should come to college without discipline in a language, such as German or Latin, which involves genders, declensions and conjugations quite different from the English, French and Spanish usages. At least two years of such a language and familiarity with the history of English literature are essential foundations for study of the humanities and, therefore, also for a medical education. Familiarity with the use of the slide rule and logarithms, a knowledge of the elemental features of trigonometry and of calculus, as well as of algebra and geometry, are prerequisites to the confident use of the methods of chemistry and physics on which all modern medicine is based. The need for premedical training in biology is certainly less urgent than for proper grounding in organic and physical chemistry, disciplines which are not only necessary if biology is to be studied from the standpoint of the physiologist, but which also impart a training in precision of thinking and of manipulation which are of the greatest value.

These subjects not only should be mandatory but are the only ones in which accomplishments, as reflected by grades, should be considered in selecting medical students. Aside from this, the prospective medical student should be given the widest possible latitude in selecting his curriculum. He should be freed from the temptation to take "pipe" courses to pull up his average grade, and made to realize fully that "not failure but low aim is crime." Advanced humanistic courses, or advanced scientific work should be encouraged even though the grades may not compare with those which students could get in other but less interesting or valuable fields. Neither number of grade points, years of attendance, nor average grades are so important as capacity to work tenaciously at some field in which precision, discrimination and application are essential. A thorough course in Hegelian philosophy in the original tongue; in advanced mathematics; in mammalian embryology; in atomic physics or in experimental genetics is worth years, or many grade points, in introductory courses in philosophy, economics, biology, appreciation of music, art or literature.

With the present intense competition for places in the freshman class in medical school, the average student must think first of his average grade; he must choose courses where grades run high, precision and competition low. This

demoralizing effect of our present methods of selection can be prevented if we take into consideration only the average grade in college courses in physics, chemistry, organic and analytical chemistry and two years of German, Latin or Greek and evaluate the remainder of the work not on grades but on type of study chosen and completed. While we should insist that the people who are to use the expensive installations for imparting a scientific medical education should be prepared to use it well, and should have demonstrated ability in the basic scientific subjects, we should not try to force them into any mold, either humanistic or scientific. Since these required courses take up about one half of a two year college course, ample time is left for the humanities, or for biological, psychological, or more advanced physical or chemical courses. Some students might benefit by rather broad programs of study the first two years.

We should be particularly anxious to prevent students sacrificing the opportunity to get a good foundation in order to anticipate or preview subjects required in medical school. On the contrary, they should receive no credit for such work and their general grades should be carefully scrutinized to make certain they are not poor students who expect to keep abreast of the medical school class only by getting a good head start. Excellent students should not be penalized if they are carried into bacteriologic, biochemical or physiologic fields before entering medical school, but for the average student the important thing is to assure a firm foundation and the ability to do good work in science when carrying full courses and competing with classes of good students.

The program outlined would bring to the medical school a group of students with wide interests, who had each cultivated fairly thoroughly some field requiring mature and conscientious work, undertaken because it was interesting and not because it promised high grades. Each of them would have demonstrated a capacity to grasp and employ the scientific methods of the chemist and physicist. The plea occasionally advanced that a young man will be an excellent physician because he is sympathetic and enjoys doing good, even if he finds mathematics dry and chemistry boring, has no value whatever today. The community spends millions of dollars providing the opportunity to teach medicine in a scientific way, and modern medicine has evolved from and is based on chemistry and physics. These vast sums were obtained under false pretenses if good physicians can be turned out without even a secure foundation in mathematics, experimental procedures and theories on which medicine itself is based. No one interested in the development of American medicine, or in maintaining the facilities for medical teaching believes for a moment that these great institutions are useless frills, or that scientific training is an unimportant part of the qualification for practice. It cannot be emphasized too strongly that since the physician's training differs from that of the quack essentially in providing a rational scientific background, we must make certain that no one enters medical school who is unable to understand or slow to become interested in the great and truly noble scientific achievements on which the art of medicine rests.

While in medical school it must never be forgotten that fundamentals must be taught first, taught coherently, and taught over and over again. Clinical

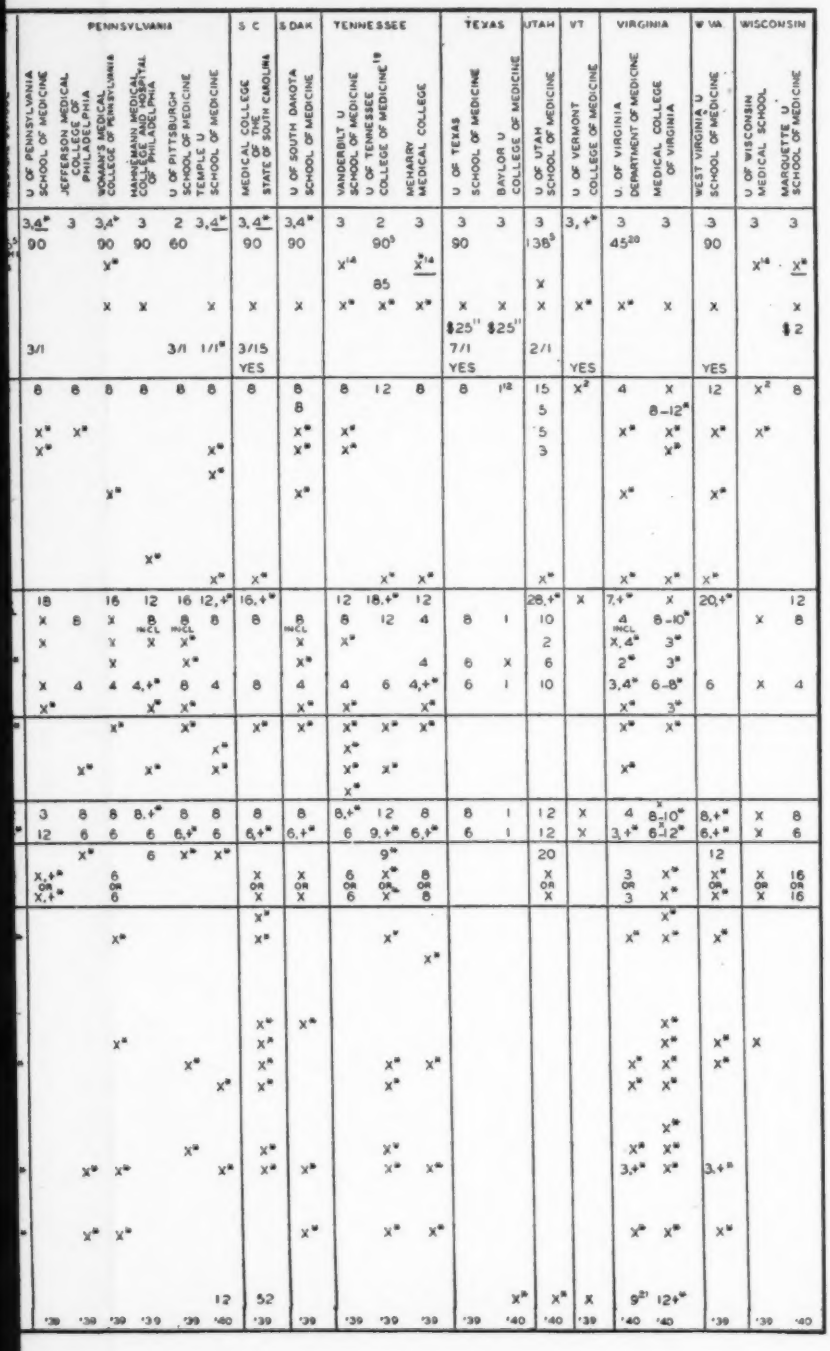
cases should not be introduced in the preclinical years except as illustrative and demonstrative material. No attempt should be made to spice up the serious task of learning fundamentals by an occasional clinical picnic or "peep" show. It is far more important for seniors and juniors to be given the opportunity to return to fundamental subjects than for freshmen and sophomores to anticipate clinical instruction, of which, with internship and modern ward teaching, they will be assured an adequate experience. Since the great expense of a medical school lies in the staff and laboratories for teaching physiology and pathology, and the disciplines needed to grasp these subjects, it may well be that, given better prepared students, more of the curriculum would be given to these subjects and less time than at present to dissecting human cadavers and to ward and clinical work. Learning the fundamentals almost always stops with graduation, while practical experience can be acquired during internship and throughout professional life. It should not be forgotten that hospitals are built primarily to care for patients (and should not be supported by medical schools!) but medical schools are created and supported to impart fundamental scientific training which cannot be taught either in the hospital or by apprenticeship. These facilities are not being used to the fullest extent at present.

As for further cultural and humanistic development after entering medical school, this will depend on the scholarly and humane interests of fellow students, of interns and of the staff members. Of the latter group, it is the younger men whose influence on the students is most important, and older men can create atmosphere of this sort only by choosing and guiding the younger teachers as wisely as possible and by themselves participating in non-medical discussions whenever the occasion presents itself. Courses in medical history or organized attempts to inculcate culture are of little influence unless it is clear to the students that physicians actually are men of wide interests and scholarly habits. If the staff is devoted to golf, bridge and detective stories for its entire extracurricular entertainment, the medical school could admit only Ph.Ds. in history and philosophy and still succeed in graduating a high percentage of medical Babbitts.

	TOTALS 78		ALA	ARK	CALIFORNIA				COLO	CONN	DISTRICT OF COLUMBIA			GEORGIA		ILLINOIS		
	REQUIRED BY	RECOMMENDED BY	U OF ALABAMA SCHOOL OF MEDICINE	U OF ARKANSAS SCHOOL OF MEDICINE	U OF CALIFORNIA SCHOOL OF MEDICINE	U OF SOUTHERN CALIFORNIA SCHOOL OF MEDICINE	STANFORD U SCHOOL OF MEDICINE	COLLEGE OF MEDICAL EVANGELISTS	U OF COLORADO SCHOOL OF MEDICINE	YALE U SCHOOL OF MEDICINE	GEORGETOWN U SCHOOL OF MEDICINE	GEORGE WASHINGTON U SCHOOL OF MEDICINE	HOWARD U SCHOOL OF MEDICINE	U OF GEORGIA SCHOOL OF MEDICINE	EMORY U SCHOOL OF MEDICINE	SCHOOL OF MEDICINE OF THE DIVISION OF BIOLOGICAL SCIENCES OF THE UNIVERSITY OF CHICAGO	NORTHWESTERN U MEDICAL SCHOOL	U OF ILLINOIS COLLEGE OF MEDICINE
YEARS IN COLLEGE	2 – 3	3 – 5	3	2	3,4+[4]	3	3	2,3±		3	3	2	2	3	3	3		3[7]
SEMESTER HOURS (TOTAL)		96	60			90	135[3]	64	135[5]		90	60	60	90	90		85	88
DEGREE	2+10[14]	5																
AVERAGE GRADE	17					C	C	C+										3.5 C+
MEDICAL APTITUDE TEST	32	22	X*		X	X	X	X*		X*			X		X			
APPLICATION FEE	15+3[11]+2[17]			$5	$3					$2	$5	$3		$2				
APPLICATION DEAD-LINE					1/15	3/1*	4/15	5/1	4/20	3/1	3/1		8/15	6/1	3/15			JUNE
PREFERENCE FOR STATE STUDENTS	15				YES									YES				YES
BIOLOGY (TOTAL)			12	8,+*	X[2]		15	8	14		8	8		8	8	X	10 INCL	10
GENERAL ZOOLOGY (OR INVERTEBRATE)			8			8[2]	4		9	X			X					X
ANATOMY (COMPARATIVE, VERTEBRATE OR MAMMALIAN)	13	21	4 OR			3	4		5	X OR		X*	X			X*	X	X
EMBRYOLOGY	11	17	4			3	4			X OR			X*			X*		X
HISTOLOGY		3								X OR								
GENETICS (HEREDITY, EUGENICS)	2	7								X OR								
CYTOLOGY		1																
BACTERIOLOGY, GENERAL	1																	
PHYSIOLOGY, GENERAL		3														X*		
ELECTIVES	2	13					3			X					3-6*	X*		
CHEMISTRY (TOTAL)			16		X		22	12			12	12		12	12,+*	X	15	16
INORGANIC			8 INCL	8 INCL		8 INCL	12	8 INCL	12	X	8 INCL	8 INCL	X	8 INCL			8 INCL	X
QUALITATIVE ANALYSIS			2	X*		X		X*		X	X	X,+*		X				
QUANTITATIVE ANALYSIS	21	22	4	X*		3	4	X	5	X		X*	X*	X		X*	X	3
ORGANIC			4,8*	4		6	6	4	12	X	4	4	X	4		X*	4	4
PHYSICAL	1	26											X*			X*		3
MATHEMATICS (TOTAL)	6	31												X*	X*	X,+*	X*	
ALGEBRA	2	9	3												X* 3-6*			
TRIGONOMETRY	3	20	3					X*				X*		X*	X*	X*	X*	
CALCULUS		6																
PHYSICS			8	8	X	8	13	8	12	X	8	8	X	8	8	X	8	8
ENGLISH			6	6,+*	X	6	9	6	15	X	6	6	8,+*	6,+*	6,+*	X	6	6
FOREIGN (MODERN) LANGUAGE	49	16												X*	6-12			
GERMAN	3		12 OR	X OR	X OR	12 OR	X OR	6 OR	15 OR	X OR	6 OR	X OR	X OR			X OR	6 OR	6 OR
FRENCH	1		12	X[1]	X	12	X	6*	15[4]	X	6	X	X			X	6	6
DRAWING		9												X*	X*	X*		
ECONOMICS	1	22											X*	X*	X*	X*	X*	X*
EDUCATION		1																
FINE ARTS		2																
GOVERNMENT		1																
GREEK		15		X*										X*	X*	X*		X*
LATIN	2	17		X*	X*									X*	X*	X*		
HISTORY		26											X*	X*	X*	X*	X*	X*
LOGIC		9													X*			
MUSIC		1																
PHILOSOPHY		7																X*
POLITICAL SCIENCE		13												X*	X*			X*
PSYCHOLOGY	8	26		X*	X*							X*	X*		3-6	X	X*	X*
PUBLIC SPEAKING		3																
RELIGION	1	1						8-12										
SOCIOLOGY	2	27		X*								X*	X*	X*	X*	X*	X*	
STENOGRAPHY		1																
U.S. CONSTITUTION	1							2										
ELECTIVES (NON-SCIENCE)			36	26				18		X				12	12	X		14*
BULLETIN DATE			'39	'39	'39	'40	'39	'39	'39	'39	'39	'40	'39	'39	'40	'39	'39	'39

	LOYOLA U SCHOOL OF MEDICINE	IND	IOWA	KANS.	KENTUCKY	LOUISIANA		MARYLAND		MASSACHUSETTS			MICHIGAN		MINN.	MISS	MISSOURI			NEBRASKA		N H	
		INDIANA U SCHOOL OF MEDICINE	STATE U OF IOWA COLLEGE OF MEDICINE	U OF KANSAS SCHOOL OF MEDICINE	U OF LOUISVILLE SCHOOL OF MEDICINE	TULANE U OF LOUISIANA SCHOOL OF MEDICINE	LOUISIANA STATE U MEDICAL CENTER	U OF MARYLAND SCHOOL OF MEDICINE AND COLLEGE OF PHYSICIANS AND SURGEONS	JOHNS HOPKINS U SCHOOL OF MEDICINE	HARVARD U SCHOOL OF MEDICINE	BOSTON U SCHOOL OF MEDICINE	TUFTS COLLEGE MEDICAL SCHOOL	U OF MICHIGAN MEDICAL SCHOOL	WAYNE U COLLEGE OF MEDICINE	U OF MINNESOTA MEDICAL SCHOOL[18]	U OF MISSISSIPPI SCHOOL OF MEDICINE	WASHINGTON U SCHOOL OF MEDICINE	U OF MISSOURI SCHOOL OF MEDICINE	ST. LOUIS U SCHOOL OF MEDICINE	U OF NEBRASKA COLLEGE OF MEDICINE	CREIGHTON U SCHOOL OF MEDICINE	DARTMOUTH MEDICAL SCHOOL	COLUMBIA U COLLEGE OF PHYSICIANS AND SURGEONS
	3		3,4*	3	2,+1*	3	3	3		2	3	3	3	3	3,+	3	3,4*	3	3,4*	3	2	3	3
	90	94	90	90		90	90		x				90	90	x[14]	90		90		90	60	86	
		Bor C[9]	C+	C			80						C+	x[14]	C			x*	x*			2.2	
			x	x*	x	x		x*		x	x	x*	x*	x*	x	x	x	x*	x	x	x	x*	x*
		$15"	$20								$5	$1			$5[17]					$5[17]			
		YES	YES	6/15 YES		3/1			6/1	3/1		12/31	3/1	5/1	1/2 YES		3/1			6/1 YES	6/30	2/15*	3/1
	8	12	8	8	x[2]		8	x	12	12	12	12	8	8									
		9				12									13[2/16]	8	8	8		8	8	12	6
3–6*				x				x*	x*			x*				x*		x				1/2	
		3		x				x*	x*	x*			x*				x*					1/2	
		2*														x*							
															x				3				
	12	16	16	15+					2	2	2	2	14	12	32	16,+*	15			12			12
		x	8 INCL	10 INCL	x	1	8	x		1	1	1 INCL x	8		x	8	x	8	8		8	1	8
			x	x											x				x*			1/2	
		5*	4	x				x*	x*	x*					x	x*	x*		x*			1/2	
	4	x	4	5	x	1/2	4	x	x	1	1	1	6	4	x	8	x	5	4	4	4	1	x
		4*					x*	x*	x*	x*		x*		x*	x	x*			x*			1/2*	
3–6*		2					x*	x*					x*		x*								
x*																x*							
x*																x*							
																x*							
	8	10	8	8	x	1	8	x	1	1	1	1	8	8	12,+*	8,+*	8	8	8	8	8	1	6
	6,+*	6,+*	6	6	x	1	6	x,+*		x	1	1	6	12,+*	9,+*	6,+*	6	6	6	6,+*	6	2	6
		10		8															8	x*			
12–16* OR 12–16*		X OR X		X OR X		1 OR 1	X* OR X*	X OR X	X	X OR X	1 OR 1	1 OR 1	12–16 OR 12–16	12 OR 12	X	6,+* OR 6,+*	10 OR 10	8 OR 8	X*	X*		2 OR 2	
															x*	x*							
		x*					x*	x*					x*	3,+*	x*	x*							
		x*																					
		x*											x*	x*		x*							
		2*,+*											x*	x*		x*							
		2*,+*							x														
		x*					x*	x*					x*	x*	x*	x*			x*	x*			
		x*														x*							
		x*																					
								x*							x*	x*			x*				
								x*							x*	x*							
3–6*		3,+2*					x*	x*				x	x*	3	6,+*	x*			x*	x*		1	
		2*											x*		x*								
																			x*				
x*		x*						x*					x*	3,+*	x*	x*			x*	x*		1	
		12,6*[10]	x					36							x*	18						2 1/2	
	'39	'40	'39	'38	'39	'39	'39	'40	'39	'39	'40	'39	'39	'39	'39	'39	'39	'40	'39	'39	'39	'39	'40

	NEW YORK									NORTH CAROLINA			N DAK	OHIO			OKLA	ORE	PENNSYLVANIA						S C	S DAK	TENNESSEE			
	ALBANY MEDICAL COLLEGE	U OF BUFFALO SCHOOL OF MEDICINE	LONG ISLAND COLLEGE OF MEDICINE	NEW YORK MEDICAL COLLEGE AND FLOWER HOSPITAL	SYRACUSE U COLLEGE OF MEDICINE	NEW YORK U COLLEGE OF MEDICINE	CORNELL U MEDICAL COLLEGE	U OF ROCHESTER SCHOOL OF MEDICINE		U OF NORTH CAROLINA SCHOOL OF MEDICINE	WAKE FOREST COLLEGE SCHOOL OF MEDICAL SCIENCES[18]	DUKE U SCHOOL OF MEDICINE	U OF NORTH DAKOTA SCHOOL OF MEDICINE	WESTERN RESERVE U. SCHOOL OF MEDICINE	OHIO STATE U COLLEGE OF MEDICINE	U OF CINCINNATI COLLEGE OF MEDICINE	U OF OKLAHOMA SCHOOL OF MEDICINE	U OF OREGON MEDICAL SCHOOL	U OF PENNSYLVANIA SCHOOL OF MEDICINE	JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA	WOMAN'S MEDICAL COLLEGE OF PENNSYLVANIA	MAHNEMANN MEDICAL COLLEGE AND HOSPITAL OF PHILADELPHIA	U OF PITTSBURGH SCHOOL OF MEDICINE	TEMPLE U SCHOOL OF MEDICINE	MEDICAL COLLEGE OF THE STATE OF SOUTH CAROLINA	U OF SOUTH DAKOTA SCHOOL OF MEDICINE	VANDERBILT U SCHOOL OF MEDICINE	U OF TENNESSEE COLLEGE OF MEDICINE[19]	MEHARRY MEDICAL COLLEGE	U OF TEXAS
	2	3			3,4*	3		3		3	4*	3		3	2	3	3	3	3,4*	3	3,4*	4*	3,4*	3,4*	3,4*	3	2	3	3
		90									90	90			145[5]	90	90	135[5] 90 SW											
				X[14]			X[14]							X[14]		X[14]	X*	X[14]	90			X*			90	X[14]	90[5]		
																	C+											85	
	X	X	X*	X*	X*						X*	X	C+	X	X*	X*	X	X				X	X	X	X	X*	X*	X*	X
			§5	§5	§2	§5					§2																			$25
		3/1	11/30		3/1	1/1	1/31	3/30					YES		2/1[16]	3/15	2/5	4/1	3/1				3/1	1/1[16]	3/15				7/1
															YES		YES								YES				YES
	8	8	6	8		8	6	1[4,12]		8	X[2]	12	8	8	12[2]	12	8	20	8	8	8	8	8	8	8	8	8	12	8	8
				X*	X											8										8				
	X*	X*	X	X*				X*				X*		X*					X*							X*		X*		
	AMB X*		X*				X*	X*				X		X*		4			X*					X*		X*		X*		
														X*																
	8*							X*																	X*					
	16	12,+*	18	12		16				12	X*		16	12	18	15		15 INCL	18		16	12	16	12,+*	16,+*		12	18,+*	12	
	8	8	12 INCL		X	12	8	1				10 INCL	X			8 INCL	8 INCL		X	8	X	8 INCL	8 INCL	8	8	8 INCL	8	12	4	8
	X		X AMB	X*								X AMB	X			X	X,+*		X		X	X	X*			X	X*			
	X		X	X*			X*	X*		X*		X		X*		X*		X*			X	X	X*			X*			4	6
	4	4	6	4	X	4	4	1		4		6	X	4		4	4	8	X	4	4	4,+*	8	4	8	4	4	6	4,+*	6
	X*			X*				X*				X*		X*			X*		X*			X*	X*			X*	X*		X*	
											X*	6						X*				X*		X*		X*	X*	X*		
	X*		X	X*			X*							X*							X*		X*				X*			
	X*			X*			X*	X*		X		X		X*			X*			X*		X*		X*				X*			
	X*						X*	X*				X*		X*														X*			
	8,+*	8	6	8	X	8	6	1,+*		8	X*	10	8	8	12	8	8	12	3	8	8	8,+*	8	8	8	8	8,+*	12	8	8
	8	6,+*	6,+*	6,+*		6	6	1		6	X*	12	10	6	8	6	6	9,+*	12	6	6	6	6,+*	X*	6,+*	6,+*	6	9,+*	6,+*	6
				6						6						6	X*				X*	6	X*	X*				9*		
	X*	X	6 OR 6	X* OR X*		X OR 1	6,+* OR 6	X			X* OR X*	X*	12-18 OR 12-18	X* OR X*				20 OR 20	X,+* OR X,+*		6 OR 6				X OR X	X OR X	6 OR 6	X* OR X*	8 OR 8	
				X*																										
		X*		X*														X*										X*		
			X*								X*										X*				X*					
				X*										X*											X*					
				X*							X*			X*				X*			X*				X*					
				X*														X*						X*	X*			X*		
			X*																						X*			X*		
				X*																					X*			X*		
	4*	X*		X*							X*							X*		X*	X*			X*	X*	X*		X*	X*	
		X*		X*							X*							X*		X*	X*				X*	X*		X*	X*	
				X*																										
			18	12											X*								12		52					
	'39	'39	'39	'39	'40	'39	'39	'39		'40	'40	'38	'39	'39	'40	'40	'40	'39	'38	'39	'39	'39	'39	'40	'39	'39	'39	'39	'39	'39



	PENNSYLVANIA						S C	S DAK	TENNESSEE			TEXAS		UTAH	VT	VIRGINIA		W VA	WISCONSIN	
	U OF PENNSYLVANIA SCHOOL OF MEDICINE	JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA	WOMAN'S MEDICAL COLLEGE OF PENNSYLVANIA	HAHNEMANN MEDICAL COLLEGE AND HOSPITAL OF PHILADELPHIA	U OF PITTSBURGH SCHOOL OF MEDICINE	TEMPLE U SCHOOL OF MEDICINE	MEDICAL COLLEGE OF THE STATE OF SOUTH CAROLINA	U OF SOUTH DAKOTA SCHOOL OF MEDICINE	VANDERBILT U SCHOOL OF MEDICINE	U OF TENNESSEE COLLEGE OF MEDICINE[19]	MEHARRY MEDICAL COLLEGE	U OF TEXAS SCHOOL OF MEDICINE	BAYLOR U COLLEGE OF MEDICINE	U OF UTAH SCHOOL OF MEDICINE	U OF VERMONT COLLEGE OF MEDICINE	U OF VIRGINIA DEPARTMENT OF MEDICINE	MEDICAL COLLEGE OF VIRGINIA	WEST VIRGINIA U SCHOOL OF MEDICINE	U OF WISCONSIN MEDICAL SCHOOL	MARQUETTE U SCHOOL OF MEDICINE
	3,4*	3	3,4*	3	2	3,4*	3,4*	3,4*	3	2	3	3	3	3	3,+*	3	3	3	3	3
	90		90	90	60		90	90		90[5]		90		138[5]		45[20]		90		
			X*						X[14]										X[14]	X*
										85				X						
			X	X		X	X	X	X*	X*	X*	X	X	X	X*	X*	X	X		X
												$25[11]	$25[11]							$2
	3/1				3/1	1/1*	3/15					7/1		2/1						
							YES					YES			YES			YES		
	8	6	8	8	8	8	8	8	8	12	8	8	12	15	X[2]	4	X	12	X[2]	8
								8						5			8–12*			
	X*	X*						X*	X*					5		X*	X*	X*	X*	
	X*					X*		X*	X*					3			X*			
			X*			X*		X*								X*		X*		
				X*			X*			X*	X*			X*		X*	X*	X*		
	18		16	12	16	12,+*	16,+*	8	12	18,+*	12			28,+*	X	7,+*	X	20,+*		12
	X	8	X	8 INCL	8 INCL	8	8	INCL	8	12	4	8	1	10		4 INCL	8–10*		X	8
	X		X	X	X*			X	X*					2		X, 4*	3*			
			X		X*			X*			4	6	X	6		2*	3*			
	X	4	4	4,+*	8	4	8	4	4	6	4,+*	6	1	10		3,4*	6–8*	6	X	4
	X*			X*	X*			X*	X*		X*					X*	3*			
			X*		X*		X*	X*	X*	X*	X*					X*	X*			
						X*			X*											
		X*		X*		X*			X*	X*						X*				
									X*											
	3	8	8	8,+*	8	8	8	8	8,+*	12	8	8	1	12	X	4	X 8–10*	8,+*	X	8
	12	6	6	6	6,+*	6	6,+*	6,+*	6	9,+*	6,+*	6	1	12	X	3,+*	X 6–12*	6,+*	X	6
		X*								9*				20				12		
	X,+* OR X,+*		6 OR 6				X OR X	X OR X	6 OR 6	X* OR X*	8 OR 8			X OR X		3 OR 3	X* OR X	X* OR X*	X OR X	16 OR 16
							X*										X*			
			X*				X*			X*						X*	X*	X*		
											X*									
							X*	X*									X*			
			X*		X*		X*		X*	X*	X*					X*	X*	X*	X	
						X*	X*			X*						X*	X*	X*		
																	X*			
					X*		X*			X*	X*					X*	X*			
		X*	X*			X*	X*	X*		X*	X*					3,+*	X*	3,+*		
		X*	X*					X*		X*	X*					X*	X*	X*		
						12	52						X*	X*	X	9[21]	12+*			
	'39	'39	'39	'39	'39	'40	'39	'39	'39	'39	'39	'39	'40	'40	'39	'40	'40	'39	'39	'40

Figures=
x=no sp
*=a re

4,8*=fo
incl=inc

1. Or Span
2. Details
3. Quarter
4. Or Span
5. Quarter
6. Admissi
7. Unless
8. Includin
9. Special
10. 12 seme
11. Returne
12. Years—
13. Elective
14. Or arra
15. Admissi
16. Quarter
17. For nor
18. Own st
19. Admiss
20. Session
21. Plus 6

KEY TO TABLE

Figures=semester hours unless otherwise indicated

x=no specific hour requirement

*=a recommendation or request:
———(underlining) indicates "preferred"

4,8*=four hours required, 8 recommended

incl=including next item in vertical column

1. Or Spanish or Italian
2. Details by reference to courses in own school
3. Quarter units in this list
4. Or Spanish
5. Quarter (or term or credit) hours in this list
6. Admission Spring, Summer or Autumn quarters
7. Unless too few applicants to fill class
8. Including at least 2 of recommended subjects
9. Special ruling for State students
10. 12 semester hours in subjects listed here as x*
11. Returned if applicant is rejected
12. Years—this school
13. Electives arranged in three groups, see Bulletin
14. Or arranged for on a combined curriculum
15. Admission of freshmen Fall and Winter quarters
16. Quarter credits in this list
17. For non-residents of the State
18. Own students given preference
19. Admission any quarter
20. Session hours—this school=2x a semester hour
21. Plus 6 session hours of science electives

Seventy-Six Variations of a Single Theme:— Premedical Education

F. H. SWETT
Department of Anatomy, Duke University School of Medicine
Durham, North Carolina

During interviews with premedical students at various stages of their training, numerous questions often arise concerning the admission requirements of various schools of medicine. The table presented herewith is an attempt to compile, as completely as is possible in this manner, the expressed requirements, recommendations and preferences of each medical school in the United States. It should be pointed out that college credits in some of the required subjects may be substituted for, in some instances, by previous courses or by a demonstrated knowledge of the material. This differential has not been indicated because of the complexity involved and its lack of pertinency to the purpose of this table. The obvious incompleteness of the "Total" column is due chiefly to the variations in manner of statement used by the different schools. Only in the mathematics and foreign language brackets do the first totals include the subordinate items. For a condensed study of the comparative requirements the reader is referred to a recent editorial compilation[1] in this JOURNAL.

In view of the recommendations of the Council on Medical Education and Hospitals of the American Medical Association[2] favoring liberalization of requirements (see also Conant,[3] Rappleye[4] and Zapffe[5]), and because of very definite steps already taken in that direction by many medical schools, the table may be out of date by the time it is published. It is presented for what it may be worth currently and as a record of the general situation in 1940.

When compared with a listing of requirements published in 1927[6] it is seen that the number of schools admitting students after only two years of preparation has dropped from about 81 per cent (of 70 schools) to less than 16 per cent (of 76). The action of the Council at its December meeting[7] probably will result in the prompt disappearance of this small remainder. Another difference noted is a definite reduction in the expression of requirements in semester hours, several schools actually limiting their statement to a quotation or a paraphrasing of the minimum requirements as set forth by the Association of American Medical Colleges[8] or by the Council.[9]

1. Edit. Entrance requirements. J. Ass. A. M. Colls., 15:265 (July), 1940.
2. Rappleye, W. C.: The advisory council on medical education. J.A.M.A., 114:1581 (Apr.), 1940.
3. Conant, J. B.: College education for the future doctor. J.A.M.A., 112:1655 (Apr.), 1939.
4. Rappleye, W. C.: Relationship of college to medical education. Bull. Ass. Am. Colls., 26:73 (Mar.), 1940.
5. Zapffe, F. C.: The relation of general education to professional education. J. Ass. A. M. Colls., 15:228 (July), 1940.
6. Edit. Summary of admission requirements of class A medical schools. Bull. Ass. A. M. Colls., 2:333 (Oct.), 1927.
7. Report of the council on medical education and hospitals. J.A.M.A., 114:1924 (May), 1940.
8. Report of the committee on education and pedagogics. Proc. Ass. A. M. Colls., p. 174, 1925.
9. Report . . . Medical education in the United States and Canada. J.A.M.A., 113:757 (Aug.), 1939.

In spite of the diversity shown by the table and still further exemplified by the brevity of statement in some bulletins and the verbosity in others, through all of them there runs an undercurrent of unanimity of opinion on what constitutes good preparation, in general, for the study of medicine. Much good advice is given whether by semester hours per subject or in the more general terms of the "liberalized" statements. However, after reading almost any one of the ably penned documents, certainly after reading several—not to say all—of them; one really wonders how the student who wants to study medicine has any idea what to do. The more liberalized the statement of requirements is, just so much greater becomes the premedical student's difficulty in determining what "courses" to take. If, in the course of events, the medical schools abolish their lists of specific requirements, and even now when so many of them have practically done so, an intellegible prospectus should be made available for the premedical student and for the college curriculum workers who are charged with guiding his efforts. Otherwise, we shall be even more liable to the criticism so often voiced by the college, that we do not seem to know what we do want. We probably do know when we get what we want, in the form of an intelligent, inquisitive, hard working medical student; but we do not seem to know how to inspire the premedical student to take the necessary steps to become that sort of a person. Possibly, the trend may lead toward Dr. Conant's[3] most attractive scheme of admitting students to medical school much earlier than is now done and then guiding them individually through their subsequent preparation. One wonders how many admission officers are going to take the time necessary to do that job adequately. Also, it may be difficult to overcome some of the administrative problems involved.[10] It is to be hoped that the Advisory Council on Medical Education may be able to devise, and to encourage the adoption of, some methods of procedure which are workable. Only in some such way, with full cooperation of students, colleges, medical schools, examiners and licensing boards, will anything like order emerge from the present muddled situation.

10. Rappleye, W. C.: The college and medical education. J. Ass. A. M. Colls., 15:221 (July), 1940.

A Comparison of Freshman Medical School Performance With Pre-Admission Factors

OMAR C. HELD

Personnel Assistant to the Dean of the College and Associate Professor of Psychology
University of Pittsburgh
Pittsburgh, Pennsylvania

For a number of years the secretary of the Association of American Medical Colleges, Dr. Fred C. Zapffe, has been reporting to the premedical colleges on the performance of their students in the first year of medical school. This information has been extremely helpful to the premedical colleges which have the responsibility of assisting the medical schools in finding competent students and eliminating those unlikely to succeed in medical college. These reports on the students' progress in medical school serve as a check on the recommendations which the premedical college staff is called on to make. If we are recommending students who are not making satisfactory progress in medical school, our recommendations will be discounted when we have a thoroughly desirable student who we feel is a good prospect for medicine.

Many variables enter into a student's success in medicine. Some can be measured, and some it probably is impossible to measure at the present time.

The premedical college of the University of Pittsburgh works in very close harmony with its Medical School in the matter of admissions, and furnishes information on some of the variables. We hand out the application blanks to students during interviews which we hold with them. The Medical School is then furnished a rank order list of the applicants on the basis of their academic scholarship in the premedical college. Other information given includes the student's standing in high school class, his rating on the psychological examination, his rating on the medical aptitude test, his age, his year in college, and his college major and minor, when they have been selected.

Science teachers are asked to fill out rating blanks on each premedical student at the time they have him in class. These blanks are filed in the College office until the student applies to the medical school. Then copies of rating blanks from two science teachers are made out and sent to the medical school along with the other information. This scheme results in getting the science teachers' appraisal of a student at a time when he is best known to the teachers. In the event a student applies to several medical schools, copies of the rating blanks are sent to them.

I have wondered about the relationship of some of the quantitative preadmission factors to success in medical school. For investigation, the University of Pittsburgh premedical students who were admitted to our own Medical School from 1935 to 1938 were selected. The report from the Association of American Medical Colleges on the students' record in medical school ranks them by thirds of the class. Hence, in this study each student's rank by thirds was tabulated for

his freshman medical school record, his premedical record, his medical aptitude test record, and his record on the American Council on Education Psychological Examination. The data are summarized in the following tables:

TABLE 1—Relationship of Premedical Grades to Medical School Grades

Standing in Premedical group—Thirds		Standing in Medical School—Thirds of Class					
		Upper		Middle		Lower	
		Number	Percent	Number	Percent	Number	Percent
Upper (120)	67.8%	46	38.3	51	42.5	23	19.2
Middle (55)	31.2%	4	7.3	25	45.4	26	47.3
Lower (2)	1.0%	0	0	0	0	2	100.0
Total (177)							

TABLE 2—Relationship of Medical Aptitude Test Score to Medical School Grades

Standing on Medical Aptitude Test—Thirds		Standing in Medical School—Thirds of Class					
		Upper		Middle		Lower	
		Number	Percent	Number	Percent	Number	Percent
Upper (72)	42.6%	25	34.7	30	41.7	17	23.6
Middle (66)	39.0%	20	30.3	30	45.4	16	24.3
Lower (31)	18.4%	4	12.9	13	41.9	14	45.2
Total (169)							

TABLE 3—Relationship of American Council on Education Psychological Examination Score to Medical School Grades

Standing on Psychological Examination—Thirds		Standing in Medical School—Thirds of Class					
		Upper		Middle		Lower	
		Number	Percent	Number	Percent	Number	Percent
Upper (73)	48%	26	35.6	28	38.4	19	26.0
Middle (58)	38%	17	29.3	27	46.6	14	24.1
Lower (21)	14%	3	14.3	11	52.4	7	33.3
Total (152)							

TABLE 4—Percentage of Upper Third Students Who Rated at Various Thirds in Medical School

Basis	Number	Upper	Middle	Lower
Pre-Med Grades	120	38.3	42.5	19.2
Med. Apt. Score	72	34.7	41.7	23.6
A. C. E. Score	73	35.6	38.4	26.0

TABLE 5—Percentage of Middle Third Students Who Rated at Various Thirds in Medical School

Basis	Number	Upper	Middle	Lower
Pre-Med Grades	55	7.3	45.4	47.3
Med. Apt. Score	66	30.3	45.4	24.3
A. C. E. Score	58	29.3	46.6	24.1

TABLE 6—Percentage of Lower Third Students Who Rated at Various Thirds in Medical School

Basis	Number	Upper	Middle	Lower
Pre-Med Grades	2	0	0	100.0
Med. Apt. Score	31	12.9	41.9	45.2
A. C. E. Score	21	14.3	52.4	33.3

Of the three factors considered, the grades made in premedical college would seem to be the best prognosticator of a student's success in medical school. This is probably to be expected. An individual's performance over a period of from

two to four years gives a better index of what we may expect of his future performance than does his performance over a period of several hours on a test. However, the medical aptitude test and the psychological examination would seem to be of sufficient worth to consider along with the student's standing in his premedical class, since they furnish a yardstick of measurement which is comparable for all students. No attempt was made to calculate statistical reliabilities, since the numbers in the various categories are too small to justify this procedure.

Table 4 shows that of those who were in the upper third on any of the three criteria slightly more than a third held this rank in medical school. In a study made by Zapffe,[1] he found that 52 per cent of the students who were in the upper third of their respective premedical classes placed in the upper third of their medical classes. Zapffe had many more subjects for study and was considering students from 600 premedical colleges who had gone to 76 medical schools. The University of Pittsburgh Medical School takes a fairly large percentage of its students from its own Premedical College and of necessity some of these people must be in the middle and lower thirds of the medical class.

TABLE 7—Medical School Standing of Students Who Were in the Upper Third with respect to Premedical Class, Medical Aptitude Test, and Psychological Examination

Medical School Standing	Number	Percent
Upper Third	17	43.6
Middle Third	17	43.6
Lower Third	5	12.8
Total	39	

TABLE 8—Medical School Standing of Students Who Were in the Upper Third in Premedical College and on the Medical Aptitude Test

Medical School Standing	Number	Percent
Upper Third	25	43.9
Middle Third	23	40.4
Lower Third	9	15.7
Total	57	

TABLE 9—Medical School Standing of Students Who Were in the Upper Third in Premedical College and on the Psychological Examination

Medical School Standing	Number	Percent
Upper Third	23	41.1
Middle Third	20	35.7
Lower Third	13	23.2
Total	56	

TABLE 10—Medical School Standing of Students Who Were in the Upper Third on the Medical Aptitude Test and on the Psychological Examination

Medical School Standing	Number	Percent
Upper Third	16	38.1
Middle Third	17	40.5
Lower Third	9	21.4
Total	42	

Students who are in the middle third on the basis of premedical grades seem to have more difficulty getting into the upper third of the medical class than do those who are in the middle third on the basis of the medical aptitude test or on the basis of the psychological examination.

The number of students who were in the lower third on any of the three

1. Zapffe, Fred C.: "Correlation of Achievement in the Arts College and in Medical School of the 1931 Freshman Medical Students." J. Asso. Am. M. Colls. 10:184-188 (May), 1935.

criteria was so small that any generalization is scarcely warranted. However, there is a strong likelihood of these people placing in the lower or middle third of their medical class.

Tables 7, 8, 9 and 10 seem to indicate that by combining the three factors in various combinations we can select those students who are going to place in the upper third of the medical class better than by using any one factor alone. However, the numbers here considered are too small to warrant calculating any statistical reliabilities which would form the basis for definite conclusions.

Predicting success in medical school involves many variables. We seem to have fairly adequate means of measuring some of these variables. It would seem that the next step would be to pursue our efforts at evaluating or measuring these other variables, which so far, because of their nature, have eluded precise evaluation or measurement.

JOURNAL
OF THE
Association *of* American Medical Colleges

Volume 15 NOVEMBER, 1940 Number 6

Selective Training

The selective training and service bill, formerly designated as the Burke-Wadsworth Bill, has been passed by Congress. Inasmuch as the bill is quite sweeping in its provisions, or lack of them, it is difficult for any one, even the authorities in Washington, to give out definite information as to how the bill affects various groups of individuals, except those few, small groups, which are exempt from the operations of the bill. Every day a new intepretation is made by some one, only to be swept aside the next day. The Attorney General has not yet passed on the bill. His opinion may bring about modifications, or it may not. In the meantime, several pronouncements have been made which can be regarded as carrying the full weight of authority.

One of these pronouncements concerns students in colleges and universities, including medical students. It is not in the nature of being an exemption from conscription but rather a "deferment." It provides that no students will be subject to conscription until July 1, 1941. What will happen after that date, whether further deferment will be permitted or not, no one knows. However, on October 3d a Bill was introduced in the Senate by Senator Murray of Montana, which amends the original Bill to the extent that conscription of students will be deferred until after their graduation and that interns and residents will be permitted to complete their work. If this Bill passes, and it has been said by persons in a position to know that it will pass, medical students will be assurred of deferment until after the internship at least, possibly until after completion of a residency. However, it has been said that the U. S. Army authorities are planning to arrange for residents, who may be conscripted, to complete their training in army hospitals if they are intending to qualify for the examination of a specialty board. That, too, however, is not yet a definite pronouncement.

So far as federal service to be given by members of medical school faculties is concerned, it is not possible to make a definite pronouncement. It is realized that it is essential for adequate medical training of undergraduate students to have men of outstanding teaching ability. In other words, "essential" teachers are needed for such training. It is recognized that many—or some, at least—of the teachers falling into this category will be eager to give service. How to retain these men in medical school faculties is a problem which is receiving serious consideration from the authorities. They do not want to deplete the faculties of medical schools. However, this is largely a purely personal problem. How can these men be persuaded to stay on the job, at least until a real emergency arises, that is, until the United States are at war with some nation or nations.

It has been suggested that medical school authorities make an urgent appeal to "essential" teachers to remain on the job with the conviction that they are giving a service which is essential for the maintenance of the health and welfare of the public as a whole. Unfortunately, there is not at the moment any way which will make it possible for these men to enter a federal service and be assigned to the medical school as a teacher or instructor. The suggestion has been made, very cautiously, it is true, but nevertheless it is evidence that thought has been given to this problem, that an insignia, such as a lapel button, for instance, could be designed and worn

by men eager to "join up" but who are really needed by the medical schools. Whether anything will come of this suggestion, no one knows. Time will give the answer. In the meantime, it would seem to be desirable that "essential" teachers should wait before joining up until some of the problems concerning deferment or needed service outside of the federal services are solved. The present emergency does not call for precipitate action, rather it calls for calm, clear thinking and careful weighing of facts as they face us now before taking any action.

Today, the above represents the thoughts of today. Tomorrow ,the picture may be entirely different. It is not possible to make a forecast or prediction one way or another.

S. 4396: In the Senate of the United States.*

October 3 (legislative day, September 18), 1940.

Mr. Murray (Montana) introduced the following bill; which was read twice and referred to the Committee on Military Affairs.

A BILL

To amend the Selective Training and Service Act of 1940.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 4 of the Selective Training and Serive Act of 1940 is hereby amended by adding at the end thereof the following new subsection:

"(c) Any man selected for training and service under this Act (1) who has been awarded a degree of doctor of medicine or doctor of dental surgery by a recognized medical or dental school, (2) who holds a valid license to practice medicine, surgery, or dentistry in any State, Territory, or possession of the United States, or the District of Columbia and is engaged in such practice at the time of his selection, and (3) whose physical and mental fitness for such training and service has been satisfactorily determined, shall, in lieu of induction into the land or naval forces of the United States for such training and service, be commissioned as an officer in the Medical Department Reserve, Officers' Reserve Corps, and ordered into the active military service of the United States as provided in the joint resolution approved August 27, 1940."

SEC. 2. Subsection (d) of section 5 of such Act is hereby amended by adding at the end thereof the following new sentences: "Medical and dental students at recogniezd medical and dental schools, and interns and resident physicians, surgeons, and dentists at recognized hospitals, shall be exempt from training and service (but not from registration) under this Act. Notwithstanding any other provision of law, any such medical or dental student, interne, or resident physician, surgeon, or dentist who is a member of a reserve component of the land or naval forces of the United States shall not be ordered or called to active duty or into active service in any of such forces without his consent, except in time of war."

*Action on this Bill doubtless will be a fact by the time this is read.

◆ ◆

Hans Zinsser

Dr. Hans Zinsser, aged 61, professor of bacteriology and immunology in Harvard University, whose reputation as a bacteriologist was world wide, died early in September of leukemia. Dr. Zinsser also had a well deserved reputation as a writer. Despite his heavy professorial duties, he found time to write such books as "Rats, Lice and History" and "As I Remember Him; the Biography of 'R. S.'," a best seller of the year. Those who knew him well feel that the latter book was really an autobiography since it portrays much of what had been Dr. Zinsser's life, experiences and work. It was a pleasure and a privilege to know Dr. Zinsser. He was a gentleman, a scholar and a real man in every sense of the word. *Requiescat in pace!*

Arthur C. Bachmeyer

Dr. Arthur C. Bachmeyer, treasurer of the Association of American Medical Colleges since 1935, assumed the presidency of the American College of Hospital Administrators at the meeting of this organization in Boston in September. Dr. Bachmeyer is Director of the University Clinics of the University of Chicago, associate dean of the Division of Biological Sciences and director of the graduate course in hospital administration at the University of Chicago. Dr. Bachmeyer is a past president of the American Hospital Association, the Ohio Hospital Association and of the American Conference on Hospital Service.

◆ ◆

Alexander S. Begg

With deep regret we announce the sudden death of Dr. Alexander S. Begg, dean, Boston University School of Medicine, September 24, 1940.

Dr. Begg was a medical educator of note. For the past seventeen years he was dean and professor of anatomy of the School. During that period of time, he was a member of the Executive Council and chairman of the Committee on Educational Policies for many years. He was deeply interested and an active participant in all the activities of the Association. At the time of his death he was chairman of the Committee on Mobilization for War appointed by the Association in October, 1939.

He was a member of many organizations and a Colonel in the Auxiliary Corps, U. S. Army; secretary of the Massachusetts Medical Society, a director of the Boston Chamber of Commerce and chairman of its Committee on Public Health, chief examiner of the Boston Subsidiary Board for the Part III examinations of the National Board of Medical Examiners and Massachusetts chairman of the Committee on Medical Preparedness of the American Medical Association.

Dr. Begg was an able executive and a fine friend. He will not soon be forgotten.

The Ann Arbor Meeting

The Ann Arbor meeting will easily go down in history as one of the outstanding meetings of the Association. The local committee, by its fine work, did honor to itself and to the University of Michigan. Genuine pleasure was expressed by all in attendance over the work of the committee. The "Parade of Medical Colleges" was excellent. The conception of such a program was highly commendable; the result—excellent.

Seventy-eight member colleges were represented by 139 delegates, the largest gathering of delegates in the history of the Association.

Much important business was transacted. The Association offered its services to the Federal government in any capacity and appointed a committee on preparedness which is to cooperate with government agencies on behalf of the medical colleges in membership in the Association.

Preparation for the study of medicine received much attention as did the internship, licensure and reciprocity. Details on these actions will be forthcoming later.

The officers elected for 1940-1941 are: President, Dr. C. W. M. Poynter, University of Nebraska; president-elect, Dr. Loren R. Chandler, Stanford University; vice president, Dr. Dudley S. Conley, University of Missouri; secretary, Dr. Fred C. Zapffe, Chicago; treasurer, Dr. Arthur C. Bachmeyer, University of Chicago. Executive Council: Dr. Russell H. Oppenheimer, Emory University, chairman; the president, president-elect, vice president, Dr. W. C. Rappleye, Columbia University; Harold S. Diehl, University of Minnesota, Dr. E. M. MacEwen, Iowa University, and Dr. Maurice H. Rees, University of Colorado.

The 1941 meeting will be held in Richmond, Virginia. Time: October 27, 28 and 29. The Medical College of Virginia will be host.

College News

Bowman Gray School of Medicine

Wake Forest College School of Medicine recently announced appointments to the faculty of the school, which will move to Winston-Salem, assuming the name Bowman Gray School of Medicine of Wake Forest College when buildings are completed, probably in 1941. Dr. Howard H. Bradshaw, associate in surgery, Jefferson Medical College of Philadelphia, has been appointed professor and director of the division of surgery; Dr. Herbert S. Wells, assistant professor of physiology, Vanderbilt University School of Medicine, Nashville, will become professor of physiology and pharmacology, and Dr. Leroy J. Butler, chief pediatrician at North Carolina Baptist Hospital, Winston-Salem, has been appointed professor of pediatrics. Others include Dr. Robert B. Lawson, instructor in pediatrics, University of Rochester School of Medicine, Rochester, N. Y., to be assistant professor of pediatrics, and Dr. George T. Harrell, Jr., assistant in medicine, Duke University School of Medicine, Durham, assistant professor of medicine in charge of laboratory diagnosis. An arrangement has been made by which the University of North Carolina School of Public Health and Preventive Medicine, Chapel Hill, will teach those subjects in the Bowman Gray school. To this end the following members of the university faculty have been appointed to the Bowman Gray faculty:

Dr. Milton J. Rosenau, dean of the university school of public health, appointed lecturer in preventive medicine and public health.

Herman Glenn Baity, Sc.D., appointed lecturer in public health.

Dr. John W. Roy Norton, appointed lecturer in preventive medicine and public health.

Dr. William Leroy Fleming, appointed lecturer in preventive medicine and public health.

Thus the university school of public health and preventive medicine, which cooperates closely with the state board of health, supplies the teaching for those subjects at the three medical schools of the state: the university, the Bowman Gray school and Duke University School of Medicine, Durham.

Dr. John A. Rose, a member of the staff of the Philadelphia Child Guidance Clinic and instructor in psychiatry at the University of Pennsylvania, has been elected associate professor of psychiatry and director of the psychiatric clinic.

The psychiatric clinic will be operated jointly with the present Child Guidance Clinic of Winston-Salem, financed by the Junior League. The Junior League will contribute $7,000 a year towards the operation of the clinic in addition to leasing their hospital to the school for a period of fifty years for the teaching of in-patient psychiatry. Dr. Rose will assume his duties on February 1, 1941.

◆ ◆

Tufts College Medical School

Four entering students at Tufts have won Commonwealth Fund scholarships. The awards are made to residents of Massachusetts, Maine, New Hampshire and Vermont. Each recipient, who receives $1,000 for each of his four years of medical training, must agree to practice in a rural community in his home state for at least three years following his hospital internship.

Of the forty-five scholarships granted since the awards were first made to the class of 1935, one only was transferred and this was at the request of the graduate himself. Eighteen Commonwealth Fund graduates are now practicing or starting their practice as family physicians in rural communities of New England; the rest are still interning or in Medical School.

University of Minnesota
Medical School

Dr. J. Frank Corbett retired July 1, 1940, as clinical professor of surgery, division of neurosurgery. Dr. Corbett was made clinical professor emeritus of surgery.

Dr. Lemen J. Wells, formerly of the University of Missouri, has been appointed associate professor of anatomy.

Dr. Charlotte M. Gast has been appointed assistant professor and assistant director, course in medical technology.

Dr. Edwin S. Fetcher, formerly of the University of Chicago, and Dr. Robert B. Dean, of the University of Rochester, have been appointed instructors in the department of physiology.

Promotions: Dr. Halvor O. Halvorson has been made professor of bacteriology; Dr. Raymond N. Bieter, professor of pharmacology; Dr. William A. O'Brien, professor of preventive medicine and public health and director of postgraduate medical education; Dr. Cecil J. Watson, professor of medicine and director division of internal medicine; Dr. William T. Peyton, professor of surgery and director division of neurosurgery; Dr. George O. Burr, professor of botany and of physiology, has in addition been appointed director of the division of physiological chemistry.

Dr. Arthur C. Kerkhof has been promoted to clinical associate professor of medicine; Dr. Starke Hathaway to clinical psychologist and associate professor of nervous and mental diseases; Dr. James B. Carey to clinical associate professor of medicine; and Dr. Wallace D. Armstrong to associate professor of physiology and director of biological research in dentistry.

◆ ◆

Duke University
School of Medicine

The following new members have been added to the faculty: In the department of psychiatry, Dr. Richard S. Lyman, professor, Dr. Hans Löwenbach, assistant professor, Dr. R. Burke Suitt, associate, Dr. Maurice H. Greenhill, associate, and Dr. Daniel J. Sullivan, instructor; in the department of medicine, Dr. Herbert J. Fox, instructor, and in the department of anatomy, Dr. Kenneth L. Duke, instructor.

◆ ◆

Dartmouth Medical School

Dr. Walter B. Lancaster, Boston, has been appointed Chief of Staff of the Dartmouth Eye Institute and will assume his new duties on November 1.

Dr. Lancaster was an associate in ophthalmology at the Harvard Medical School and consulting ophthalmic surgeon at the New England Hospital for Women and Children. He will relinquish this work to devote himself fully to his new post at Dartmouth.

◆ ◆

University of Georgia
School of Medicine

A $10,000 renovation of the library has been completed. This more than doubles the floor space. A grant of $10,000 has been received from the Rockefeller Foundation for books and journals. A three story annex to the University Hospital for white nurses and a three story building for Negro nurses have also been erected.

◆ ◆

Woman's Medical College
of Pennsylvania

The ninety-first annual session opened on September 18th. Dr. Catharine Macfarlane, Interim Dean, announced minor faculty changes and reported an enrollment of 115 students, including 41 in the first year class.

Dr. Chevalier Jackson, President of the College, introduced the newly appointed Acting Dean, Dr. Margaret D. Craighill, a graduate of Johns Hopkins Medical School. In a few well chosen words, Dr. Craighill greeted Corporators, Faculty and Students, and declared her intention to maintain the high standards set by her predecessor, Dr. Martha Tracy.

An interesting address on "The Colonial Hospital" was delivered by Dr.

Francis R. Packard, after which Mrs. James Starr announced the awarding of 16 scholarships.

The Committee on Therapeutic Research of the Council of Pharmacy and Chemistry of the American Medical Association has granted to Dr. Ben King Harned, professor of pharmacology, and Dr. Versa V. Cole, associate professor of pharmacology, $300 for the investigation of the effects of sulfanilamide and sulfapyridine on hepatic function.

Dr. Esther L. Richards, associate professor of psychiatry, Johns Hopkins University, spoke at the College in October on "Pediatric Psychiatry."

The enrollment for 1940-1941 includes thirty-seven first year students and three new members for the third year class.

◆ ◆

University of California
Medical School

Dr. William J. Kerr, professor of medicine, formerly president of the American Rheumatism Association, has been elected an honorary of the Liga Argentina contra el Reumatismo of Buenos Aires, Argentina.

Dr. Howard C. Naffziger, professor of surgery, is a member of the Surgical Committee of the National Research Council.

Dr. Francis S. Smyth, professor of pediatrics, has returned from a sabbatical leave of absence spent in South America, part of the time in the laboratories of Professor B. A. Houssaye of the Physiological Institute of Buenos Aires, Argentina.

A group of medical students, who are interested in medical history, have established an Osler Club, along the lines of a similar organization at McGill University Faculty of Medicine. It is planned to hold about four meetings each year and, in addition, an annual banquet. On all of these occasions, speakers will present various phases of medical history and different aspects of the life of William Osler.

The University of California Medical School is making plans for an intensive refresher course on "The Clinical Aspects of Dermatology." This will be held in Toland Hall, University of California Hospital, San Francisco, from January 6 to 8, 1941, inclusive. The program, which is now being prepared, will cover various common skin conditions, including tumors. Surgical aspects of dermatological problems will be considered and there will be lectures on infectious diseases.

The Dean's Office, University of California Medical School, Medical Center, San Francisco, will be glad, upon request, to supply any physician with more complete information about the course.

◆ ◆

Emory University
School of Medicine

Mr. John H. Cordes, appointed assistant in anatomy, will fulfill during the present session the duties of the position left vacant by the resignation of Dr. Charles W. Harwell. Dr. Harwell, assistant professor of micro- and neuroanatomy for sixteen years has accepted appointment for a three months training course in the School of Public Health of the University of North Carolina after which he will go to an assignment as a county health officer.

◆ ◆

University of North Carolina
School of Medicine

Wesley C. George, Ph.D., professor of histology and embryology has been appointed head of the department of anatomy to succeed the late Dr. Chas. S. Mangum.

◆ ◆

University of Virginia
Department of Medicine

Dr. Herbert Silvette, assistant professor of pharmacology, materia medica and toxicology, has received a grant of $250 from the American Medical Association in support of his study of the antidiuretic hormone of the pituitary gland.

Tulane University of Louisiana
School of Medicine

Dr. William Burton Clark, associate professor of ophthalmology, has been appointed professor, effective September 1. He succeeds Dr. Wiley R. Buffington, who has retired to devote his full time to private practice.

The annual week of intensive graduate medical instruction at Tulane university's school of medicine was held October 7-12.

Six days of lectures and dry clinics were offered by members of the faculty.

The course was designed primarily to put in touch with modern trends and developments of medicine those practitioners who have been removed from the medical centers and who have consequently been unable to keep up with the rapid progress of medical learning.

Clinics of an hour's duration were offered each morning with patients' conditions diagnosed and outlined for the benefit of the audience.

Lectures of 15 minutes were given each afternoon with a short question and answer period set aside after each speaker.

One of the features of the instruction was a symposium on peptic ulcer, conducted by Dr. M. E. DeBakey, etiology and pathologic physiology; Drs. Leon J. Menville and J. N. Ane, radiology; Dr. Donovan C. Browne, medicine, and Dr. Alton Ochsner, surgery.

◆ ◆

Medical College of Virginia

A symposium on industrial health was held September 12 and 13 under the sponsorship of the department of preventive medicine in cooperation with the department of clinical education of the Medical Society of Virginia.

There were registered for the symposium, 108 physicians, 19 public health nurses, 62 managers, personnel directors, division and unit superintendents in industrial plants, 68 medical students and 108 persons representing ten other classifications.

Wayne University
College of Medicine

Dr. Carl C. Pfeiffer, of Peoria, Illinois, has been added to the staff of the department of pharmacology. Dr. Pfeiffer received his training in pharmacology at the University of Wisconsin where he earned his A.B., M.D., and Ph.D. degrees with Dr. A. L. Tatum, and at the University of Chicago where he was awarded his M.D. degree and served for three years on the staff in the department of pharmacology under Dr. E. M. Geiling. At Wayne he will be in charge of the new branch of toxicology and will supervise the pharmacodynamic work in the College of Pharmacy.

Dr. Paul S. Larson, formerly of Richmond, Virginia, has been appointed lecturer in the department of pharmacology. Dr. Larson received his A.B. and Ph.D. degrees under Dr. James Olmsted at the University of California and has also been associated with Georgetown University School of Medicine and the Medical College of Virginia. At present he is associated with Fredrick Stearns & Company as pharmacologist.

◆ ◆

University of South Dakota
School of Medicine

Dr. Carroll A. Handley, Ph.D. (U. of California), has been appointed assistant professor of physiology and pharmacology to succeed the late Dr. Harry V. Atkinson. Dr. Walvin R. Giedt, assistant professor of pathology, has been granted a year's leave of absence to pursue graduate work at Johns Hopkins University. Dr. Fred Dick has been given an interim appointment to the position left vacant by Dr. Giedt.

◆ ◆

Northwestern University
Medical School

Charles W. Patterson, Ph.C., registrar for twenty-seven years, has been retired with the title associate professor emeritus of pharmacology. He had been associated with the school for forty-seven years.

Jefferson Medical College

The 116th annual session was inaugurated September 18, 1940. Mr. Robert P. Hooper, president of the Board of Trustees, presided. The introductory lecture was delivered by Dr. Hobart A. Reimann, Magee Professor of Practice of Medicine and Clinical Medicine, on "Education of the Medical Student."

The total enrollment is 513. Of this number, 147 are new students; 133 admissions to the first-year class, and 14 admissions to the third year class.

The members of the first-year class were prepared for medical study in 75 different institutions; all having completed four years of college work and received a bachelor's degree before being admitted to the medical course.

◆ ◆

University of Vermont
College of Medicine

The Burlington Free Dispensary will offer more coordinated and more convenient service to its patients, drawn from the underprivileged of Burlington, as it opens its new schedule for 1940-41 under the management of its new full-time Medical Director, Dr. Theodore H. Harwood. Dr. Harwood is Assistant Professor of Medicine in the University of Vermont College of Medicine. He will have general supervision over all the medical activities carried on at the Dispensary. Arrangements have been made under his direction to see that each new patient will pass through an admissions clinic for diagnosis before being referred to other clinics for treatment.

New times set for clinics are earlier, in order that patients may be given more prompt attention. Dr. Harwood, in addition to overseeing the whole program of clinics, will have direct supervision of the medical clinic, which, according to the new schedule, will be held every afternoon at 2 p.m.

The Burlington Free Dispensary is operated by the City of Burlington through the Charities Department and the University of Vermont College of Medicine. Its schedule of clinics includes surgery, medicine, pediatrics, gynecology, obstetrics (pre- and post-natal), mental hygiene (for children up to 18), orthopedic surgery, urology, dermatology, allergy, physiotherapy, eye, ear, nose and throat, syphilis, state clinics for chest diseases, and the new squint clinic for the correction of cross eyes.

Plans are now under way for the extension of the teaching in the fourth, or senior, year from 32 weeks to 44 weeks, or from approximately eight months to eleven months. The plan will go into effect June 1, 1941.

◆ ◆

Long Island College of Medicine

Promotions: Dr. Joseph B. L'Epicopo, professor of clinical orthopaedic surgery, (succeeding Dr. Jaques C. Rushmore, who was made an Emeritus Professor.); Dr. E. Jefferson Browder, clinical professor of surgery and neurology and psychiatry; Dr. Stanley S. Lamm and Dr. Lewis A. Koch, clinical professor of pediatrics; Dr. Abraham M. Rabiner, clinical professor of neurology and psychiatry; Dr. Elliston Farrell, assistant clinical professor of medicine; Dr. Gaetano DeYoanna, assistant clinical professor of surgery; Dr. L. Milford Andersen and Dr. Emanuel Mendelson, assistant clinical professor of radiology.

Dr. Duncan William Clark, of Brooklyn, N. Y., was recently awarded a Commonwealth Foundation Fellowship for a year's study of metabolism under Dr. John P. Peters of Yale University School of Medicine. At the completion of his period of study, Doctor Clark wil return to the Long Island College of Medicine to take up his regular activities as a member of the department of medicine.

◆ ◆

Cornell University
Medical College

Training in military medicine has been elected by almost one-half of the student body. Courses in the subject

are being offered to all four classes. Of the 274 male students, 113 are taking military training and will be eligible on graduation for commissions as first lieutenants in the Medical Reserve Corps.

Designed to provide the army with trained, young medical personnel, similar courses are being given in approximately 30 selected medical colleges throughout the country, Cornell being the designated place of study for New York City. Lt. Col. Philip B. Connolly, U.S.A., retired, has been detailed by the War Department to direct the study.

Supplementing the college's regular medical curriculum, the courses cover the principles of military science, first aid, treatment of war wounds, camp and field sanitation, preventive medicine as it relates to the diseases common to armies, and related subjects. In addition to didactic instruction and demonstrations, a six week camp is held at Carlisle Barracks, Pa., at the end of the second or third year.

◆ ◆

Meharry Medical College

Dr. W. P. Quinn is the recipient of a National Cancer Institute Fellowship grant for study in x-ray and radium diagnosis and treatment this next year. He will be studying in Bellevue Hospital, New York.

Doctor Silcott, has just completed one and a half years of fellowship study with Doctor Ebaugh and Dr. Neuburger in neurology and psychiatry at the University of Colorado Psychiatric Hospital.

Doctor Bone has completed a most successful year of study in the Department of Pharmacology at the University of Illinois. Doctor Bone has been made a member of the Sigma Xi honorary scientific fraternity and has a number of publications to his credit during the year.

◆ ◆

Howard University
School of Medicine

Dr. Numa P. G. Adams, dean, died in Chicago following an operation. Dr. Joseph L. Johnson, vice dean, will carry on until a successor to Dr. Adams is appointed.

◆ ◆

University of Chicago

The medical department eventually will receive all of the estimated $100,000 estate of the late William S. Oppenheim. Under a trust established by the will, the income will go to relatives during their lifetime. The entire residuary estate is left to the university.

◆ ◆

Columbia University College of
Physicians and Surgeons

Dr. Willard C. Rappleye, dean, has been appointed commissioner of hospitals, succeeding Dr. Sigismund S. Goldwater. Dr. Rappleye has been granted a fifteen months leave of absence from his university position. He was to begin his new work October 2. He has been dean at Columbia since 1931 and professor of medical economics since 1932; acting dean of the School of Dental and Oral Surgery at Columbia, 1933-1934, and dean since 1934. Since 1933 Dr. Rappleye has been director of the New York Post-Graduate Medical School and Hospital.

General News

*Report on Research on Lag Error in Mercurial Sphygmomanometers**

The Committee for the Standardization of Blood Pressure Readings of the American Heart Association[1] make the following statements concerning manometer accuracy:

"The blood pressure equipment to be used, whether mercurial or aneroid, should be in good condition and calibrated at yearly intervals—more often if defects are suspected.

"The relative merits of various types of blood pressure apparatus have been the subject of numerous reports. In the opinion of the joint committees, mercurial and aneroid types of apparatus are capable of correct readings if they are in good condition, and both types of equipment may produce inaccurate results if not in good condition. This factor is often overlooked in the case of the mercury manometer, which should be checked at intervals as to the following points:

"(1) The level of the mercury at rest should be exactly at the zero mark. If some of the mercury has leaked out, this will not be the case. The missing mercury should be replaced.

"(2) If the small air vent at the top of the glass tubing becomes clogged, a definite lag may be produced; the mercury column may not register the pressure in the bag, and the readings will therefore be incorrect.

"(3) The apparatus must be on a level surface, since tilting of the manometer will result in incorrect readings. It should also be level with the observer's eyes."

The report of this committee has been accepted and endorsed by the American Heart Association, the Cardiac Society of Great Britain and Ireland, and the Association of Life Insurance Medical Directors of America. The following discussion deals with the lag mentioned in item 2.

Years ago, the manometers used for blood pressure measurement were simple open-top U-tubes containing mercury. As the demand from the profession grew, manufacturers undertook to supply mercury manometers in a more convenient and a more readily portable form. Development along such lines has resulted in the familiar portable mercurial sphygmomanometers of today.

In order to avoid spilling mercury from a portable manometer, it is necessary to close the top of the column with a cap through which the mercury will not flow. At the same time, this cap must be porous in order that the air pressure inside the glass tube, above the mercury column, may always be in equilibrium with the atmospheric pressure surrounding the cuff. This latter condition is necessary because clinical blood pressure measurement is customarily based upon reading the amount by which the changing air pressure inside the constricting cuff exceeds the atmospheric pressure outside the cuff.

Portable mercurial sphygmomanometers in common use at the present time are not capable of reading precisely when the cuff pressure is changing. As soon as the cuff pressure begins to decrease, the mercury column falls and a partial vacuum is momentarily created inside the glass tube above the mercury. This happens because air flow through the porous cap member is too slow to maintain equal pressures inside and outside the tube. As a result, the manometer reading is too high by an amount which has been termed lag error. This lag error remains entirely undisclosed by the most careful tests at stationary pressures.

The degree of vacuum created in the

*Published with permission of Medical Department, Taylor Instrument Companies, Rochester, New York.

1. J.A.M.A. 113:294 (July 22), 1939.

glass tube depends directly on the speed at which the cuff pressure, and hence the mercury column, is falling. As the deflation rate increases, the partial vacuum above the mercury column increases, and the lag error of the manometer increases.

From the foregoing discussion, it becomes evident that portable mercury manometers in use today will read too high when measuring falling pressures. Since this is the condition universally used for clinical blood pressure determinations, it is important to learn how much lag error is to be expected in any particular mercurial instrument.

In order to interpret the measurement of lag error in a manometer, it is first necessary to learn what deflation speed, or range of speeds, is commonly used in clinical practice. To accomplish this, a pressure recorder (kymograph) was connected to the arm cuff during measurements of blood pressure by various practitioners, using their customary technique and their own equipment. Where the observer slowed the deflation speed when nearing the systolic or diastolic level (or reinflated from just below that level and checked the reading at a slower rate), the slow rate is used in Fig. 1.

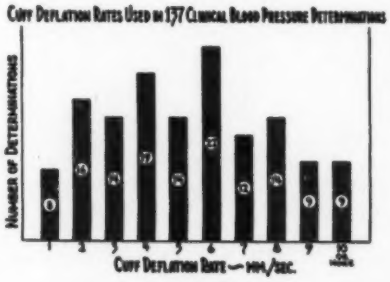


Figure 1.

It will be noted from Fig. 1 that actual clinical practice varies over a wide range of deflation speeds; that rates from 2 to 8 mm./sec. are much used; that the rate of 6 mm./sec. is used most frequently; and that the average deflation rate (in 137 determinations) lies between 5 and 6 mm./sec. This study also showed that a single observer uses many different deflation speeds on a series of patients, employing a distribution of rates much the same as that shown in Fig. 1. On the basis of the above study, it was concluded that a cuff deflation rate of 5 to 6 mm./sec. might reasonably be accepted as representing average clinical practice.

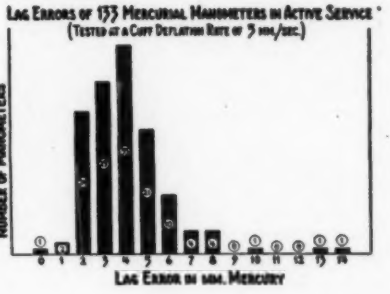


Figure 2.

At the suggestion and with the cooperation of the American Heart Association Committee, portable test equipment was developed for quantitative testing of sphygmomanometers under both falling and stationary pressure conditions. Using the portable standard thus developed, 133 mercurial manometers in actice service in medical schools and hospitals throughout the United States were tested for lag error at a deflation speed of 5 mm./sec. The results are shown in Fig. 2.

Examination of Fig. 2 shows the following:

(1) 58% of the mercurial manometers tested have lag errors of 4 mm. or more under average clinical conditions.

(2) 16% of the mercurial manometers tested have lag errors of 6 mm. or more under average clinical conditions.

(3) The average instrument has a lag error of 4 mm. under average clinical conditions.

Since deflation speeds actually used by practitioners are frequently greater than

5 mm./sec., much greater lag errors frequently occur in an even greater percentage of instruments. This variability with deflation speed is the most insidious characteristic of lag error. It would not be a difficult matter to make allowance for a constant error, but in the case of lag error such a procedure is obviously impossible.

The practice of slightly reinflating the cuff from just below the systolic level is seldom effective in eliminating lag error. The report of the Committee for the Standardization of Blood Pressure Readings of the American Heart Association recommends a steady deflation rate of not more than 2—3 mm. per second from 30 mm. above the level at which the radial pulse disappears to complete deflation. Acceptance of this recommendation will yield a significant improvement in the accuracy of mercurial manometer readings. For the average instrument, the lag error at such slow deflation speeds may be clinically unimportant. However, for some instruments, lag error will be excessive even at these speeds.

◆ ◆

The Medical Council of Canada

The Medical Council of Canada has introduced a method by which any recognized university or medical college in Canada which desires to hold its final examinations coincidentally with the conducting of the examinations of the Medical Council of Canada, may do so by making a request to the Registrar of the Medical Council on or before February 15th, in any year, for the necessary arrangements to be made.

A plan whereby medical students in their final year in universities in Canada, might write only one set of papers for their university graduation and licentiate standing, was first presented by Dr. E. Stanley Ryerson in 1927, at the Second Conference of the Medical Services of Canada in Ottawa. The Medical Council has opened the door for any university which desired to do so, to take advantage of this method of coincidental examinations and it is hoped that before many years all Canadian Medical Schools will avail themselves of this opportunity of entering into this simplified procedure of determining that their students are eligible for graduation and for obtaining their licentiate at the same time.

The Council also decided to reduce the examination fee from $75.00 to $50.00.

Officers elected by the Council for the year 1940-1941 were: President: Dr. E. Stanley Ryerson, University of Toronto; Vice-President: Dr. A. T. Mathers, University of Manitoba; Registrar: Dr. J. Fenton Argue, Ottawa, Ontario.

◆ ◆

Residency in Psychiatry

There is a vacancy for a junior resident in psychiatry at the Detroit (Mich.) Receiving Hospital. The position pays $1,000 a year and maintenance. Applicants must have completed a year's residency and should have a license to practice in the State of Michigan or be in position to secure one promptly.

Applications should be addressed to Dr. James M. Stanton, psychiatrist, Receiving Hospital, Detroit, Michigan.

◆ ◆

New Color Blindness Tests

New color blindness tests have been compiled by the U. S. military authorities, thereby making this country independent of Germany and Japan, principal sources of previous color perception tests, it is announced by the American Optical Company. The new tests, approved for use in the armed forces of the United States by the Surgeons General, will replace as a national standard in this country the Ishihara test, printed in Japan, and the Stilling system, of Germany, both of which are practically impossible to obtain due to the war.

The new compilation, which will be distributed by the optical concern, incorporates the best of the Ishihara and Stilling tests and adds features leading

to the detection of those persons who do not wish to pass a color blindness test and also those attempting to hide their color blindness.

The 46 diagrams or charts to be used are composed of patterns (figures, letters, etc.) made up of variously shaded dots of the primary colors set on a differently colored background of similar dots in confusion colors. While the figures are easily seen by a normal person, the color blind individual, unable to differentiate colors, cannot distinguish the figures from the background. In mild forms of color blindness, hesitancy in naming the figures reveals the weakness.

The 46 plates provide for the detection of each type of color blindness, the particular type and degree being determined by noting the plates missed or read with hesitation. As the mere naming of the figures or letters suffices, color ignorance does not interfere with the test, while for testing a completely illiterate or speechless person all he has to do is trace the outline of the designs seen.

◆ ◆

Internships and Residencies

Beginning July 1, 1941, Grant Hospital, Columbus, Ohio, will have 4 internships and 2 mixed residencies available. The Hospital is a general, voluntary Institution of 300 beds. It is approved by the American College of Surgeons and by the A.M.A. for mixed residencies. Last year the admissions by departments were 2926 surgical, 1643 medical, 1013 obstetrical, 965 newborn, and 547 E. E. N. T.

The duties are those usually expected of a house staff—routine rounds, assistance at operations, intravenous infusions, dressings, etc. Five externs from Ohio State University College of Medicine are appointed whose chief duties are the writing of histories and physicals. Interns and residents are expected to write progress notes and summaries. Both interns and residents rotate service.

Salary is $100.00 a month for residents, and $50.00 a month for interns. Maintenance and laundry are furnished but uniforms are not provided. Living and recreational facilities are very satisfactory. All men are expected to live in the Intern Quarters.

◆ ◆

Kellogg Foundation

George B. Darling, Dr.P.H., associate director, and Emory W. Morris, D.D.S., associate executive director of the W. K. Kellogg Foundation, Battle Creek, were elected president and general director, respectively, August 19, succeeding the late Dr. Stuart Pritchard, who held both positions. The foundation has announced that it would spend $2,553,650 in the coming year to further the health and well-being of children. All but $634,000 will be spent in the counties of Calhoun, Allegan, Van Buren, Barry, Branch, Eaton and Hillsdale, where the foundation conducts community health projects. The $634,000 will be expended as grants to various institutions.

◆ ◆

Robert James Terry Lecture

The late Dr. William T. Coughlin, professor of surgery, St. Louis University School of Medicine, St. Louis, bequeathed $5,000 in his will to the St. Louis Medical Society to establish and maintain an annual lecture to be known as the "Robert James Terry Lecture."

◆ ◆

Abbott Fellowships in Chemistry

For the academic year 1940-1941 Abbott Laboratories has established fellowships in several universities with important departments of organic chemistry and biochemistry. The fellowships, carrying stipends of $650 a year, will be available to graduate students in the last or next to last year of graduate work leading to the doctorate degree. The recipients, who are to be selected by the universities in which their work is being done, are not limited as to the subjects on which they will work. The object of the fellowships is to provide means for the carrying on of additional scientific work in American universities. Grants

for work in organic chemistry will be made to Cornell, Harvard, Illinois and Michigan universities and in biochemistry to California, Columbia and Cornell.

◆ ◆

Microfilm Service of Army Medical Library

A new microfilm service has been established in the Army Medical Library in Washington, D. C. It will be conducted on a nonprofit basis solely for making the extensive medical literature collections of the Army Medical Library available to research workers who are unable to come in person to consult them. The library cooperates by providing the necessary space for the work and by supplying the publications from which the microfilm copies are made. The only cost to the user is for the actual labor and materials required in making and distributing the microfilm copies. The photographic copies on moving picture film of the separate articles in the periodicals are made at 30 cents for each complete article not exceeding thirty pages in length and ten cents for each succeeding ten pages or fraction thereof. A pamphlet describing the service and also containing the latest list of the approximately 4,000 medical and related periodicals currently received by this library will be sent to those desiring to avail themselves of this service. In addition to medical periodicals the library also possesses an extensive collection of manuscripts and incunabula of which microfilm copies may be obtained. Requests should be made to Microfilm Service, Army Medical Library, Seventh Street and Independence Avenue S.W., Washington, D. C.

◆ ◆

Northwestern University

Eighty fledgling doctors are among the students who are "living high" in the new 20-story Abbott hall, believed to be the tallest building in the world used exclusively as a university dormitory. Housing 850 students on the university's Chicago campus, where the medical and dental schools and the school of law are located, the new building is 210 feet tall and cost more than $1,750,000.

It is a city in itself, with shops, libraries, dining rooms, lounges, exercise facilities including bowling alleys and squash courts, and a recreational roof garden. The building was named for Wallace C. Abbott, founder of Abbott laboratories, and his wife, Clara A. Abbott, from whose estate Northwestern university received a gift of $1,500,000 for use in medical, chemical and surgical research. Each residential floor accommodates 56 students and has two shower rooms, two lavatories, and a large lounge facing toward the lake.

Arrangements permit members of the 15 fraternities which had occupied temporary residences near the campus to have a floor, or a part of a floor, for their exclusive use. Among fraternities using the building's facilities are several medical groups. The dormitory relieves congestion in near north side housing.

The skyscraper dormitory is the eighth structure on Northwestern university's Chicago campus, where the professional schools and the evening departments are located. In 1924, Mrs Montgomery Ward gave more than $8,000,000 to build and endow the Ward Memorial building, which houses the classrooms and clinics of the medical and dental schools.

Now being rushed to completion is the 20-story Wesley Memorial hospital building, which is being erected at a cost of $3,000,000. The second hospital on the campus of the university, it will supplement the Passavant Memorial hospital as a teaching center for students in the university's medical school. It is the first unit of the proposed George Herbert Jones Hospital center, which eventually will include an amphitheater, chapel, nurses' dormitory and diagnostic clinic.

A third hospital on the campus will be started soon. This building has been made possible by a gift in excess of $2,000,000 from the estate of Mrs. Margaret Gray Morton to be used for the erection and endowment of a hospital and for medical research.

Book News

A Textbook of Medicine

By American Authors. Edited by Russell L. Cecil, M.D., Professor of Clinical Medicine, Cornell University Medical College. Associate Editor for Diseases of the Nervous System, Foster Kennedy, M.D., Professor of Clinical neurology, Cornell University Medical College. 5th Ed. W. B. Saunders Company, Philadelphia. 1940. Price, $9.50.

An authoritative summary of present day medicine, completely revised, with new articles on subjects not covered by previous editions and new treatises on subjects previously covered. Most of the contributors are teachers of medicine in medical colleges, hence the text should be acceptable to medical students.

◆ ◆

Applied Pharmacology

By Hugh A. McGuigan, M.D., Professor of Pharmacology and Therapeutics, University of Illinois College of Medicine. The C. V. Mosby Company, St. Louis. 1940. Price, $9.00.

Physiology, biochemistry and pharmacology are connected with clinical application of drugs—which is as it should be. Usually pharmacology is taught as an abstract subject without any reference to the important place which the use of drugs must occupy in practice. Pharmacodynamics is stressed far beyond the needs of the practitioner. Therapeutics too often receives but scant attention. The author of this book endeavors to right this wrong and thereby advances the cause of pharmacology as an essential subject in the education of the future practitioner.

◆ ◆

Practical Clinical Psychiatry

By Edward A. Strecker, M.D., Professor of Psychiatry, University of Pennsylvania School of Medicine, and Franklin G. Ebaugh, M.D., Professor of Psychiatry, University of Colorado Medical School. Section on Psychopathological Problems of Childhood by Leo Kanner, M.D., Associate Professor of Psychiatry, Johns Hopkins University School of Medicine. 5th Ed. The Blakiston Company, Philadelphia. 1940. Price, $5.

This thoroughly revised edition presents concisely and systematically the essentials of a broad and modern practice of psychiatry. Many additions to drastic therapies and valuable material on mass psychopathology have been incorporated. The section on psychobiology is greatly expanded. Many additional references are included.

The case method is emphasized and the mentally sick patient is brought direct to the physician through the printed page. A representative of each group as seen in actual life in the hospital, clinic and private practice is studied.

◆ ◆

Heart Failure

By Arthur M. Fishberg, M.D. Associate in Medicine, Mount Sinai Hospital, New York City. 2nd Ed. Lea & Febiger, Philadelphia. 1940. Price, $8.50.

The new material added includes the introduction of quantitative methods for the measurement of some of the fundamental circulatory variables in health and disease and a better understanding of the dynamics of the diseased circulation. The many advances now make possible a clearer interpretation of the clinical picture and the treatment of the patient. It is the aim of this book to interpret these advances for the practicing physician in a manner which will aid him to recognize, prevent and treat every manifestation of circulatory failure. It deals with heart disease only as it concerns this condition and the mechanisms that lead to it.

◆ ◆

Physical Diagnosis

By Ralph H. Major, M.D., Professor of Medicine, University of Kansas. 2nd Ed. W. B. Saunders Company, Philadelphia. 1940. Price, $5.00.

Sections on the abdomen, genitalia and extremities have been enlarged; the section on examination of the nervous system has been rearranged and, in many places, entirely rewritten. Much new material has been added and many new illustrations without increasing the size of the book. A deservedly popular book for students.

◆ ◆

The Virus: Life's Enemy

By Kenneth M. Smith, F.R.S. The Macmillan Company, New York. 1940. Price $2.

An account of the discovery and pursuit of the viruses—the nature of the virus, the virus in action, relationship between viruses and the insects which spread them, the virus and the living cell, important virus diseases and prevention and control of viruses.

Pharmacology and Therapeutics

By Arthur R. Cushny, M.D., late Professor of Materia Medica and Pharmacology, University of Edinburgh. Thoroughly revised by C. W. Edmunds, M.D., Professor of Materia Medica and Therapeutics, University of Michigan, and J. A. Gunn, M.D., Professor of Pharmacology, University of Oxford. 12th Ed. Lea & Febiger, Philadelphia. 1940. Price, $6.50.

For many years the trend of pharmacology was critical with the result that many worthless drugs were dropped from the pharmacopœias. Constructive pharmacology is growing, however, and the extensive additions and alterations in this edition bear witness to its advances and to an increasing interest in therapeutics. This thoroughly revised and carefully compiled edition is in every way worthy of the original author.

◆ ◆

Physical Diagnosis

By William N. Anderson, M.D., Associate Clinical Professor of Medicine, University of Southern California School of Medicine. Lea & Febiger, Philadelphia. 1940. Price, $4.75.

The fundamental principles of palpation, percussion and auscultation are discussed in the opening section. In the second part of the book the methods of examination are covered. The third portion of the book presents a description of the characteristic symptoms and signs of important diseases of the heart, circulation, respiratory system and abdominal organs. The arrangement of the book is such as to make its information readily accessible. The text is clear, comprehensive and absolutely authoritative. It teaches bedside diagnosis from the symptoms of disease that makes the practice of medicine an art and gives to each symptom its proper valuation which may afterwards be confirmed in the laboratory.

◆ ◆

America Gives a Chance

By John J. Mullowney, M.D., Former president of Meharry Medical College, Nashville, Tennessee. The Tribune Press, Tampa, Florida. 1940. Price, $3.

The author was left an orphan at an early age. From a "home" in Seacombe, near Liverpool, England, he was sent to Canada for adoption. A family of frontier Scotch farmers took him in there, but subsequently left him behind when they moved to the States. He began to make his way alone when he was no more than 12, and his greatest interest was to secure an education. Eventually he won a scholarship to Phillips Exeter Academy, went on to the University of Pennsylvania, studied medicine and emerged as a man of science. His career then took him to China, where he served as a medical missionary in the critical years of the overthrow of the Manchu dynasty, 1908 to 1912. After that he was a public health officer in the lowest of Philadelphia's slums, a teacher in Girard College and finally accepted a call to the presidency of Meharry Medical College, in Nashville, Tenn.

He tells all this in a simple manner in which enthusiasm for his work and gratitude to God for his chance to serve humanity are about equal components. It is a fine story—that of character triumphing over odds. It is a stimulus for the "poor boy" who wants to study medicine and has no funds to gratify his ambition. It tells how one poor boy overcame all obstacles—and there were many—and how each conquest was the result of almost superhuman effort. The years passed but the poor boy won out in the end, gratified every ambition with credit to himself and those who helped him to win. Every boy in a similar position should read this book to bolster up his courage and to give him hope that "it can be done."

◆ ◆

Introduction to Medical Biometry and Statistics

By Raymond Pearl, Professor of Biology in the School of Hygiene and Public Health and in the Medical School, The Johns Hopkins University. 3rd Ed. W. B. Saunders Company, Philadelphia. 1940. Price, $7.

In making this rather extensive and intensive revision, the author has kept in mind that the text must remain an "introduction" to biometric and statistical work and that it must retain its value in the fields of medicine and public health. He has succeeded well in reaching his objectives.

◆ ◆

Clinical Methods

A Guide to the Practical Study of Medicine, by Sir Robert Hutchison, M.D., Consulting Physician to the London Hospital, and Donald Hunter, M.D., Physician to the London Hospital. 11th Ed. Paul B. Hoeber, Inc., Medical Book Department Harper & Brothers, New York City, 1940. Price, $5.

A handy little volume for the medical student to carry in his pocket. It is a veritable "multum in parvo." Covers all the body systems and methods of examining them. The chapter on "case taking" is excellent.

◆ ◆

Aids to Inorganic Chemistry

By R. G. Austin, B.S. (Lond.), Lecturer on Chemistry, Municipal College, Portsmouth, England. A William Wood Book, The Williams & Wilkins Company, Baltimore. 1940. Price, $1.50.

"A course of inorganic chemistry followed by students of medicine . . ."

Simplified Diabetic Manual

By Abraham Rudy, M.D., Chief of the Diabetic Clinic, Beth Israel Hospital, Boston; Instructor in Medicine, Tufts College Medical School. Introduction by Dr. Frederick M. Allen. M. Barrows Company, Inc., New York. 1940. Price, $2.

A good book for the patient and the doctor. More than 150 recipes of various nations have been compiled and worked out in a manner to be easily comprehended and followed in the preparation of meals. The whole subject of diabetes is discussed clearly and fully.

◆ ◆

Modern Dermatology and Syphilology

By S. William Becker, M.D., Associate Professor and Maximillian E. Obermayer, M.D., Assistant Professor of Dermatology and Syphilology, Kuppenheimer Foundation, University of Chicago. J. B. Lippincott Company, Philadelphia. 1940. Price, $12.00.

An exhausive and complete presentation; beautifully illustrated with nearly 500 well selected cuts, many in color. A large book, but easily read because of the double column. Selected chapter references add to the completeness of the work. The manner of presenting each topic is highly to be commended. It is systematic; center and side heads add to ready reference. Nearly 200 pages are devoted to syphilis, the discussion including every phase of the subject regarded as of importance today in the anti-syphilis campaign.

◆ ◆

Bailey's Textbook of Histology

By Philip E. Smith, Professor of Anatomy, Columbia University College of Physicians and Surgeons and four co-editors. 10th Ed. A William Wood Book: The Williams & Wilkins Company, Baltimore. 1940. Price, $6.

Rewritten; revised; two new chapters added: (1) Morphogenesis; (2) organization of nervous tissue. Many new and original figures added; structure and function correlated. Any book which goes into ten editions must be good.

◆ ◆

Preventive Medicine

By Mark F. Boyd, M.D., International Health Division of the Rockefeller Foundation. 6th Ed. W. B. Saunders Company, Philadelphia. 1940.

Meets well the needs of the expanding interest in public health and preventive medicine. Present edition extensively revised and much new material added to sections dealing with syphilis, pneumonia, tuberculosis, meningitis, etc. Good book for medical students.

Holt's Diseases of Infancy and Childhood

By the late L. Emmett Holt, M.D., and John Howland, M.D. Revised by L. Emmett Holt, Jr., M.D., Associate Professor of Pediatrics, Johns Hopkins University, and Rustin McIntosh, M.D., Carpentier Professor of Pediatrics, Columbia University. 11th Ed. D. Appleton-Century Company, New York. 1940. Price, $10.

Extensive changes have been made in this edition. Large parts have been rewritten. A section devoted to diseases of the eye has been added. New growth charts and tables of ossification are given. The aim and purpose of the book is to furnish a guide to practical therapy based on a thorough understanding of the nature of disease. Necessaily a bulky book because of its completeness and thoroughness.

◆ ◆

Manual of Embryology

Development of the Human Body. By J. Ernest Frazer, D.Sc., F.R.C.S., Professor of Anatomy in the University of London. 2nd Ed. A William Wood Book: The Williams & Wilkins Company, Baltimore. 1940. Price, $9.

Completely revised; much new material and new illustrations. The general plan of the first edition is retained.

Latona and the Rustics

This old story, as it is told
In classic Greek mythology,
Shows how the trials of a god
Worked well for physiology.

Latona, wife of Jupiter
And mother of Apollo,
Was made a weary wanderer
By the acts of jealous Juno.

Juno was the favored wife
Of Jupiter on Olympus,
And there arose a family strife,
So Latona left Olympus.

And with Apollo on her arm,
Quite unknown to all observers,
She reached in Lycia, a farm,
Where young rustics gathered osiers.

Then the persecuted goddess
Found clear water, so much needed,
She knelt to quench her thirstiness,
But the rustics her prevented.

With raucous laughter they did burst,
And with their feet did muddy all,
While Latona, weakened much from thirst,
But for Apollo, she would fall.

The goddess then became enraged,
With lifted hands to Heaven exclaimed,
"They'll live within the pool," she said,
And in the pool they since have stayed.

Still they live in briny water,
Sometimes coming to the brink,
Voices harsh, throats bloated ever,
Their muddied water they must drink.

Their necks have shrunk and disappeared,
With heads shoved into their bodies,
Their backs are green, their eyes are bleared,
And white their bloated bellies.

These rustic Lycians live still
In the muddy slimy water.
It's doubtful if Latona will
Forget or forgive their laughter.

H. A.

SUBJECT INDEX FOR VOLUME 15

AUTHORS' INDEX FOR VOLUME 15

JOURNAL
of the
Association of American Medical Colleges

Volume 15 NOVEMBER, 1940 Number 6

CONTENTS

ASSOCIATION OF AMERICAN MEDICAL COLLEGES

OFFICERS FOR 1940-1941

President: C. W. M. POYNTER, University of Nebraska
President-Elect: LOREN R. CHANDLER, Stanford University
Vice President: DUDLEY S. CONLEY, University of Missouri
Secretary: FRED C. ZAPFFE, Chicago
Treasurer: A. C. BACHMEYER, University of Chicago

EXECUTIVE COUNCIL

RUSSELL H. OPPENHEIMER (Emory), Chairman; C. W. M. POYNTER (Nebraska)
LOREN R. CHANDLER (Stanford); DUDLEY S. CONLEY (Missouri)
MAURICE H. REES (Colorado); WILLARD C. RAPPLEYE (Columbia)
HAROLD S. DIEHL (Minnesota); E. M. MACEWEN (Iowa)

MEMBERS

Alabama

University of Alabama, School of Medicine, University.

California

College of Medical Evangelists, Loma Linda and Los Angeles.
Stanford University School of Medicine, San Francisco and Stanford University.
University of California Medical School, San Francisco and Berkeley.
University of Southern California School of Medicine, Los Angeles.

Canada

Dalhousie University Faculty of Medicine, Halifax, N. S.
McGill University Faculty of Medicine, Montreal.
Queen's University Faculty of Medicine, Kingston.
University of Alberta Faculty of Medicine, Edmonton.
University of Manitoba Faculty of Medicine, Winnipeg.
University of Toronto Faculty of Medicine, Toronto.
University of Western Ontario Medical School, London.

Colorado

University of Colorado School of Medicine, Denver.

Connecticut

Yale University School of Medicine, New Haven.

District of Columbia

George Washington University School of Medicine, Washington.
Georgetown University School of Medicine, Washington.
Howard University College of Medicine, Washington.

Georgia

Emory University School of Medicine, Atlanta.
University of Georgia School of Medicine, Augusta.

Illinois

Loyola University School of Medicine, Chicago.
Northwestern University Medical School, Chicago.
University of Chicago Medical Schools, Chicago.
University of Illinois College of Medicine, Chicago.

Indiana

Indiana University School of Medicine, Bloomington and Indianapolis.

Iowa

State University of Iowa College of Medicine, Iowa City.

Kansas

University of Kansas School of Medicine, Lawrence and Rosedale.

Kentucky

University of Louisville School of Medicine, Louisville.

Louisiana

Louisiana State University School of Medicine, New Orleans.
Tulane University of Louisiana School of Medicine, New Orleans.

Maryland

Johns Hopkins University School of Medicine, Baltimore.
University of Maryland School of Medicine, Baltimore.

Continued on Third Cover Page

Published bimonthly, January, March, May, July, September and November, at 5 South Wabash Avenue, Chicago, Illinois, by the Association of American Medical Colleges. Subscription price $3.00 per year. Single copies, 75 cents.

Entered as second class matter January 17, 1930, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879.

(Continuing the Bulletin of the Association of American Medical Colleges)

MEMBERS—*Continued*

Massachusetts

Boston University School of Medicine, Boston.
Harvard Medical School, Boston.
Tufts College Medical School, Boston.

Michigan

University of Michigan Medical School, Ann Arbor.
Wayne University College of Medicine, Detroit.

Minnesota

University of Minnesota Medical School, Minneapolis.
University of Minnesota Graduate School, Medical Department (Mayo Foundation), Minneapolis and Rochester.

Mississippi

University of Mississippi School of Medicine, University.

Missouri

St. Louis University School of Medicine, St. Louis.
University of Missouri School of Medicine, Columbia.
Washington University School of Medicine, St. Louis.

Nebraska

Creighton University School of Medicine, Omaha.
University of Nebraska College of Medicine, Omaha.

New Hampshire

Dartmouth Medical School, Hanover.

New York

Albany Medical College, Albany.
Columbia University College of Physicians and Surgeons and New York Post Graduate Medical School, New York.
Cornell University Medical College, New York.
Long Island College of Medicine, Brooklyn.
New York Medical College and Flower Hospital, New York.
New York University College of Medicine, New York.
Syracuse University College of Medicine, Syracuse.
University of Buffalo School of Medicine, Buffalo.
University of Rochester School of Medicine, Rochester.

North Carolina

Duke University School of Medicine, Durham.
University of North Carolina School of Medicine, Chapel Hill.
Wake Forest College School of Medicine, Wake Forest.

Ohio

Ohio State University College of Medicine, Columbus.
University of Cincinnati College of Medicine, Cincinnati.
Western Reserve University School of Medicine, Cleveland.

Oklahoma

University of Oklahoma School of Medicine, Oklahoma City.

Oregon

University of Oregon Medical School, Portland.

Pennsylvania

Hahnemann Medical College and Hospital, Philadelphia.
Jefferson Medical College of Philadelphia.
Temple University School of Medicine, Philadelphia.
University of Pennsylvania School of Medicine and Graduate School of Medicine, Philadelphia.
University of Pittsburgh School of Medicine, Pittsburgh.
Woman's Medical College of Pennsylvania, Philadelphia.

Philippine Islands

University of the Philippines College of Medicine, Manila.

South Carolina

Medical College of the State of South Carolina, Charleston.

South Dakota

University of South Dakota School of Medicine, Vermillion.

Tennessee

Meharry Medical College, Nashville.
University of Tennessee College of Medicine, Memphis.
Vanderbilt University School of Medicine, Nashville.

Texas

Baylor University College of Medicine, Dallas.
University of Texas Department of Medicine, Galveston.

Utah

University of Utah School of Medicine, Salt Lake City.

Vermont

University of Vermont College of Medicine, Burlington.

Virginia

Medical College of Virginia, Richmond.
University of Virginia Department of Medicine, Charlottesville.

West Virginia

West Virginia University School of Medicine, Morgantown.

Wisconsin

Marquette University School of Medicine, Milwaukee.
University of Wisconsin Medical School, Madison.